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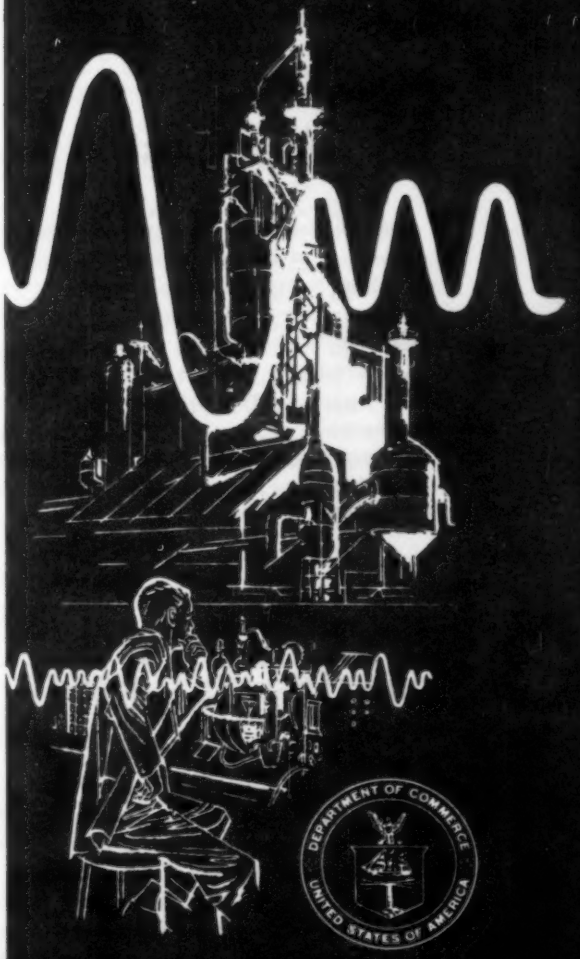

U. S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
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U.S. GOVERNMENT RESEARCH REPORTS

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(A) COLLISION CROSS SECTIONS WITH SPECIAL REFERENCE TO ATOMIC AND MOELCULAR COLLISIONS; (B) ATOMIC SCATTERING PROCESS; (C) HIGH-RESOLUTION GROUND-BASED SIMULTANEOUS MEASUREMENT OF IONOSPHERIC ELECTRON DENSITY AND COLLISION FREQUENCY.
AD-275 509 DIV. 20

*ATOMIC MASS UNIT

TABLES OF MASS SPECTROGRAPHIC LINES OF CHEMICAL ELEMENTS RECORDED FROM THE LINES SEEN BY RF SPARK IONIZATION OF SELECTED INORGANIC SOLIDS.
AD-275 468 DIV. 20

*ATOMS

(A) COLLISION CROSS SECTIONS WITH SPECIAL REFERENCE TO ATOMIC AND MOELCULAR COLLISIONS; (B) ATOMIC SCATTERING PROCESS; (C) HIGH-RESOLUTION GROUND-BASED SIMULTANEOUS MEASUREMENT OF IONOSPHERIC ELECTRON DENSITY AND COLLISION FREQUENCY.
AD-275 509 DIV. 20

*ATTENUATION

PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH POWER TRANSMISSION LINES IN A TRENCH COVERED BY COAL, COKE AND EARTH.
AD-275 390 DIV. 25

*ATTITUDES

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AD-275 855 DIV. 28

*AUTOMATION

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AD-275 393 DIV. 32

*AUXILIARY POWER PLANTS

THE FEASIBILITY OF VARIOUS AUXILIARY POWER SYSTEMS FOR USE IN AEROSPACE VEHICLES IS REPORTED.
AD-275 371 DIV. 7

ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF THE FEASIBILITY OF POWER TRANSMISSION BY MEANS OF ACOUSTIC OR VIBRATORY MECHANICAL ENERGY IS PRESENTED.
AD-275 546 DIV. 7

*AXIAL-FLOW COMPRESSORS

THE AERODYNAMIC CALIBRATION OF THE AEDC PWT 16-FOOT SUPERSONIC TUNNEL COMPRESSOR.
AD-275 743 DIV. 30

*AXIALLY SYMMETRIC FLOW

THE SLOW STEADY FLOW OF A VISCOUS INCOMPRESSIBLE ELECTRICALLY CONDUCTING FLUID ABOUT A UNIFORMLY MAGNETIZED SPHERE.
AD-275 462 DIV. 25

*AZIDES

THERMAL DECOMPOSITION OF AG COATED PB(N3)2 KINETIC THEORY OF THIS PROCESS IS BASED ON THE CATALYTIC EFFECT OF AG; WATER REVERSES THE EFFECT OF THE AG CATALYST.
AD-275 877 DIV. 4

***BEACHES**

GEOGRAPHICAL AND CLIMATIC FACTORS ABOUT COASTAL BURMA, MALAYA, THAILAND, CAMBODIA, AND VIETNAM
AD-275 476 DIV. 2

***BEAMS**

DYNAMIC RESPONSE AND ULTIMATE STRENGTHS OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS.
AD-275 474 DIV. 15

SNAPPING PHENOMENA OF ELASTIC-PLASTIC CURVED BEAMS UNDER STATIC AND DYNAMIC LOADINGS.
AD-275 779 DIV. 25

***BENZIMIDAZOLES**

MERCAPTOETHYL COMPOUNDS: SYNTHESIS OF HETEROCYCLES INCLUDING PYRIDINES, PYRIMIDINES, PHTHALAZINES, QUINAZOLINE, CINNOLINE, QUINOXALINES, PYRIDAZINE AND BENZIMIDAZOLE AS RADIOPROTECTIVE DRUGS.
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THERMOCHEMICAL INVESTIGATIONS ON ALKYL-SUBSTITUTED BENZOIC ACIDS. DATA ON THE HEATS OF COMBUSTION AND SYNTHESIS OF 2 POLYMETHYL AND 7 OTHER ALKYLBENZOIC ACIDS.
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A COMPARISON OF BE WITH STEEL AND AL AND TI ALLOYS FOR STRUCTURAL APPLICATIONS IN SUPERSONIC COMMERCIAL TRANSPORT AIRCRAFT.
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PREPARATION OF HIGH PURITY BE SINGLE CRYSTALS AND FOILS AND A STUDY OF THEIR DEFORMATION AND FRACTURE CHARACTERISTICS. ZONE MELTING AND COMPRESSION TENSION AND ELECTRICAL RESISTIVITY MEASUREMENTS.
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***BETA DECAY**

THE TRANSVERSE POLARIZATION OF INTERNAL CONVERSION ELECTRONS EMITTED FOLLOWING BETA DECAY.
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***BIBLIOGRAPHY**

A STATE-OF-THE-ART STUDY OF THEORY AND PRACTICE OF COORDINATE INDEXING WHICH COVERS NEARLY EVERY MECHANIZED SYSTEM. AN ANNOTATED BIBLIOGRAPHY OF SIGNIFICANT PAPERS PUBLISHED BETWEEN 1947 AND 1960.
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A BIBLIOGRAPHY OF MASERS, LASERS, AND ERASERS, COVERING THE PERIOD 1959 TO PRESENT CONTAINING BIBLIOGRAPHIES, BOOKS, AND ARTICLES SPECIFICALLY APPLICABLE TO USSR.
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AN INDEX OF REPORT ABSTRACTS OF RADIATION EFFECTS ON VARIOUS MATERIALS AND EQUIPMENTS. INCLUDED ARE METALS, ELECTRONIC EQUIPMENT, CERAMICS ORGANIC SUBSTANCES, SPACE SHIPS, ETC. COVERS PERIOD 1 APR 62-30 APR 62.
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A BIBLIOGRAPHY OF 89 ABSTRACTED REPORTS OF RECENT (1959-1961) LITERATURE ON NON-DESTRUCTIVE TESTING OF ROCKET MOTOR CASES. THE LIST IS LIMITED TO STRUCTURES WOUND FROM WIRE AND FROM FILAMENTS OF GLASS FIBER-RESIN COMPOSITES.
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A BIBLIOGRAPHY OF REFERENCES PERTAINING TO GASEOUS AND SOLID STATE AREAS OF INVESTIGATION AS APPLIED TO LASERS AND MASERS FOR OPTICAL COMMUNICATION.
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A BIBLIOGRAPHY OF 150 ABSTRACTED PUBLICATIONS ON SEISMOLOGY AND DETECTION OF UNDERGROUND EXPLOSIONS. PROGRAM COVERS SEISMIC SOURCE MECHANISMS, WAVE PROPAGATION, PROPAGATION PATHS, SIGNAL DETECTION, DATA, GENERAL STUDIES, AND ELECTROMAGNETIC SIGNALS FROM UNDERGROUND DISTURBANCES.
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A BIBLIOGRAPHY OF TECHNICAL ABSTRACTS RELATING TO THE DIELECTRICS OF HIGH FREQUENCY HEATING OF NON-CONDUCTING MATERIALS.
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A BIBLIOGRAPHY OF 350 ABSTRACTED PAPERS, REPORTS, AND BOOKS DEALING WITH PROBLEMS OR TOOLS OF CODING THEORY. CONTAINS GENERAL EXPOSITIONS OF CODING, MATHEMATICAL AND THEORETICAL RESULTS, NEW APPROACHES, AXIOMATIC STUDIES, APPLICATIONS, DECODING PROCEDURES, ROUND, NON-BINARY CODES, ETC.
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RECOMMENDATIONS ARE GIVEN FOR THE EVALUATION AND SPECIFICATION OF AIRCRAFT BOLTS FOR FATIGUE SITUATIONS.
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A COMBINATION OF ANALOG AND DIGITAL COMPUTING TECHNIQUES IS PRESENTED AS A WAY TO INCREASE EFFECTIVENESS IN CALCULATING REAL-TIME OF AIRCRAFT THROUGH SIMULATION.
AD-275 649 DIV. 30

AN EXPERIMENTAL METHOD FOR CALCULATING ELEMENTARY PARTICLE CONSTANTS IS DESCRIBED.
AD-275 663 DIV. 25

#COMPUTERS

A STATE-OF-THE-ART STUDY OF THEORY AND PRACTICE OF COORDINATE INDEXING WHICH COVERS NEARLY EVERY MECHANIZED SYSTEM. AN ANNOTATED BIBLIOGRAPHY OF SIGNIFICANT PAPERS PUBLISHED BETWEEN 1947 AND 1960.
AD-275 393 DIV. 32

A DESCRIPTION OF THE BASIC ELEMENTS OF PROGRAMMING LANGUAGE.
AD-275 823 DIV. 30

AN ANALYSIS OF VARIOUS FIELDS OF TECHNOLOGY AND INTELLIGENCE BY A COMPUTER ROUTINE.
AD-275 827 DIV. 30

#CONCRETE

DYNAMIC RESPONSE AND ULTIMATE STRENGTHS OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS.
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#CONDITIONED REFLEX

DEVELOPMENT OF AN ADVANCED CONDITIONED REFLEX MODEL OR COMPUTER SYSTEM.
AD-275 935 DIV. 30

#CONDUCTORS

TRANSLATION OF RUSSIAN TEXTBOOK ON THE PHYSICAL, CHEMICAL, AND MECHANICAL PROPERTIES OF MATERIALS USED IN THE ENGINEERING OF RADIO AND ELECTRONIC EQUIPMENT, INCLUDING DIELECTRICS, CONDUCTORS, SEMICONDUCTORS, AND MAGNETIC MATERIAL.
AD-275 736 DIV. 14

#CONFERENCES

PROCEEDINGS OF THE NAVY LABORATORY MICROELECTRONICS PROGRAM CONFERENCES, REPORTS ON THE PROGRAMS AND PLANS OF NAVY LABORATORIES AND NAVY CONTRACTORS IN MICROELECTRONICS.
AD-275 495 DIV. 8

#CONFORMAL MAPPING

CONCEPTS OF EXTREMAL FUNCTIONS DEFINED ON CERTAIN CLASSES OF DOMAINS.
AD-275 351 DIV. 15

#CONICAL BODIES

HEAT TRANSFER TESTS OF CONES TO DETERMINE THE EFFECTS OF TUNNEL RUN TIMES, MACH NUMBER AND OTHER PARAMETERS ON THE HEAT TRANSFER COEFFICIENT.
AD-275 431 DIV. 9

THE DYNAMICS OF SPINNING BODIES AT LARGE ANGLES OF ATTACK.
AD-275 437 DIV. 12

#CONICAL NOZZLES

THE EFFECT OF ORIFICE DIAMETER AND MOLECULAR WEIGHT ON SECONDARY GAS INJECTION IN ROCKET MOTOR NOZZLES.
AD-275 463 DIV. 12

#CONTINUUM MECHANICS

THIS INVESTIGATION IS CONCERNED WITH THE DYNAMICS OF A PLANE JET OF FLUID STRESSED PERPENDICULARLY BY AN ELECTRIC FIELD.
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#CONTROL

THE EFFECT OF ORIFICE DIAMETER AND MOLECULAR WEIGHT ON SECONDARY GAS INJECTION IN ROCKET MOTOR NOZZLES.
AD-275 463 DIV. 12

#CONTROL SYSTEMS

THE EFFECT OF ORIFICE DIAMETER AND MOLECULAR WEIGHT ON SECONDARY GAS INJECTION IN ROCKET MOTOR NOZZLES.
AD-275 463 DIV. 12

PERFORMANCE CRITERIA FOR LINEAR CONSTANT-COEFFICIENT FLIGHT CONTROL SYSTEMS WITH DETERMINISTIC INPUTS.
AD-275 515 DIV. 1

THE LOGIC OF AN APPROACH TO THE ANALYSIS OF COMPLEX SYSTEMS.
AD-275 534 DIV. 30

SIMULATION TESTS OF THE STABILITY AND MANUAL CONTROLLABILITY OF THE TANDEM PROPELLER SUBMARINE. HUMAN ENGINEERING FOR THE DISPLAY AND CONTROL SYSTEMS OF DYNAMIC SUBMARINES.
AD-275 580 DIV. 31

PERFORMANCE OF THE HUMAN OPERATOR IN TRACKING TASKS WITHOUT VISUAL FEEDBACK. CONSERVATION OF TRACKING INFORMATION IN A SYSTEM WITHOUT DYNAMICS! REPRESENTATION OF A HUMAN OPERATOR ON AN OPEN-LOOP TASK BY A LINEAR TIME-VARYING MODEL.
AD-275 774 DIV. 6

A COMPUTERIZED PROCEDURE - ORIENTED LANGUAGE PROGRAM FOR COMMAND CONTROL SYSTEMS.
AD-275 826 DIV. 30

A SIMULATED OPERATIONS RESEARCH MODEL OF A COMPLEX SYSTEM WITHOUT REGARD TO THE MECHANICAL ASPECTS.
AD-275 828 DIV. 26

#CONVECTION

FREE CONVECTIVE HEAT TRANSFER AND COUPLED VIBRATIONS: BASIC EQUATIONS AND BOUNDARY CONDITIONS.
AD-275 770 DIV. 25

FREE CONVECTIVE HEAT TRANSFER: A COMPARISON OF THE INFLUENCE OF MECHANICAL AND ACOUSTIC VIBRATION.
AD-275 771 DIV. 25

FREE CONVECTIVE HEAT TRANSFER UNDER THE INFLUENCE OF VIBRATIONS: THE MECHANISM OF THE INTERACTION.
AD-275 773 DIV. 25

#COPOLYMERIZATION

THE VARIATION IN VISCOELASTIC BEHAVIOR WITH TEMPERATURE OF A SERIES OF COPOLYMERS OF PHOSPHOROUS AND SULFUR.
AD-275 392 DIV. 4

#COPPER ALLOYS

ALUMINUM BASE ALLOYS AL 1.7 AT .4 CU AND AL-5.3 AT .8 ZN: GUNIER-PRESTON ZONE FORMATION AND REVERSION.
AD-275 481 DIV. 17

MECHANICAL PROPERTY DATA FOR AL AND TI ALLOYS AT CRYOGENIC TEMPERATURES.
AD-275 483 DIV. 17

#CORRECTIONS

A BIBLIOGRAPHY OF 350 ABSTRACTED PAPERS, REPORTS, AND BOOKS DEALING WITH PROBLEMS OR TOOLS OF CODING THEORY. CONTAINS GENERAL EXPOSITIONS OF CODING, MATHEMATICAL AND THEORETICAL RESULTS, NEW APPROACHES, AXIOMATIC STUDIES, APPLICATIONS, DECODING PROCEDURES, ROUND, NON-BINARY CODES, ETC.
AD-275 718 DIV. 30

#CORROSION

STEEL PANELS COATED WITH ULTRA-THIN FILMS OF ALOX 2028 (MIXTURE OF ORGANIC ACIDS AND ESTERS) SHOWED THE BEST CORROSION PREVENTION PROPERTIES. CORROSION AND HUMIDITY CABINET EQUIPMENT.
AD-275 360 DIV. 17

CORROSION DATA AND A SUMMARY OF PHYSICAL AND CHEMICAL PROPERTIES OF 1-1-2-TRICHLORTRIFLUOROETHANE AND 1-2-DIBROMOTETRAFLUOROETHANE WITH EMPHASIS ON THEIR COMPATIBILITY WITH METALS, PLASTICS, AND ELASTOMERS USED IN MISSILE APPLICATIONS.
AD-275 427 DIV. 10

#CORROSION INHIBITION

STEEL PANELS COATED WITH ULTRA-THIN FILMS OF ALOX 2028 (MIXTURE OF ORGANIC ACIDS AND ESTERS) SHOWED THE BEST CORROSION PREVENTION PROPERTIES. CORROSION AND HUMIDITY CABINET EQUIPMENT.
AD-275 360 DIV. 17

#COSTS

INDUSTRIAL PRODUCTION AND QUALITY CONTROL FOR EXPENSIVE ITEMS.
AD-275 491 DIV. 26

#COUPLED ANTENNAS

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED, AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS, VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

#CREEP

RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO, AM355, AND 4340 STEELS; B120 VCA TI ALLOY; RENE 41 NI-BASE ALLOY; AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
AD-275 398 DIV. 17

A THEORY FOR CREEP BUCKLING OF PERFECT FLAT PLATES UNDER AXIAL COMPRESSION IS EXTENDED TO A GENERAL THEORY FOR PLATES AND SHELLS UNDER VARIOUS TYPES OF LOADINGS.
AD-275 615 DIV. 17

#CRYOGENICS

RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO, AM355, AND 4340 STEELS; B120 VCA TI ALLOY; RENE 41 NI-BASE ALLOY; AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
AD-275 398 DIV. 17

MODIFICATION OF A 30-FOOT BEAM APPARATUS FOR MEASURING LIFETIME METOSTABLE STATE OF HELIUM IS DESCRIBED, AND A DESCRIPTION IS GIVEN OF MOLECULAR PHYSICS PROJECTS INCLUDING OPTICAL MASERS, MOLECULAR BEAMS, MICROWAVE AND MASS SPECTROSCOPY, AND RADIOASTRONOMICAL MEASUREMENTS.
AD-275 422 DIV. 25

MECHANICAL PROPERTY DATA FOR AL AND TI ALLOYS AT CRYOGENIC TEMPERATURES.
AD-275 483 DIV. 17

A STUDY OF FROZEN GASES BY USE OF THE X-RAY COUNTER DIFFRACTION METHOD. A SPECTROGONIOMETER CRYOSTAT HAS BEEN CONSTRUCTED AND TESTED.
AD-275 596 DIV. 25

***CRYOSTATS**

A STUDY OF FROZEN GASES BY USE OF THE X-RAY COUNTER DIFFRACTION METHOD. A SPECTROGONIOMETER CRYOSTAT HAS BEEN CONSTRUCTED AND TESTED.
AD-275 596 DIV. 25

***CRYSTAL RECTIFIERS**

THE SUBLIMINATION TECHNIQUE FOR GROWING HEXAGONAL SILICON CARBIDE CRYSTALS, CONTROLLED BY A VACUUM FURNACE OF NEW DESIGN, FOR SILICON CARBIDE RECTIFIER PRODUCTION IS DESCRIBED. STUDIES OF METHODS AND MATERIALS OF DEVICE FABRICATION TO MEET VACUUM-TIGHT OPERATIONS ARE PRESENTED. ELECTRICAL CHARACTERISTICS OF A RECTIFIER ARE INCLUDED.
AD-275 540 DIV. 8

***CRYSTAL STRUCTURE**

BRIEF SURVEY OF RESEARCH IN SOLID STATE PHYSICS, RADIOCHEMISTRY, PHYSICAL ELECTRONICS, AND ADVANCED THEORY BRANCHES OF MATERIALS USED IN ELECTRONIC EQUIPMENT AND ELECTRON TUBES.
AD-275 401 DIV. 14

ALUMINUM BASE ALLOYS AL 1.7 AT .8 CU AND AL-5.3 AT .8 ZN: GUNIER-PRESTON ZONE FORMATION AND REVERSION.
AD-275 461 DIV. 17

AN INVESTIGATION OF THE PARAMAGNETIC IONS WITH LATTICE VIBRATIONS IN IONIC CRYSTALS AND THE THEORY OF RELAXATION EFFECTS IN EXCITED STATES IN RUBIES AND LANTHANIDES.
AD-275 763 DIV. 25

***CRYSTALS**

BRIEF SURVEY OF RESEARCH IN SOLID STATE PHYSICS, RADIOCHEMISTRY, PHYSICAL ELECTRONICS, AND ADVANCED THEORY BRANCHES OF MATERIALS USED IN ELECTRONIC EQUIPMENT AND ELECTRON TUBES.
AD-275 401 DIV. 14

FEASIBILITY OF USING THE SUPERCONDUCTIVE PROPERTIES OF CERTAIN METALLIC THIN FILM CONFIGURATIONS TO PERFORM ELECTRONIC FUNCTIONS SUCH AS RADIOFREQUENCY DETECTION. METALLIC CRYSTALS AS SUPERCONDUCTORS.
AD-275 472 DIV. 25

THE SUBLIMINATION TECHNIQUE FOR GROWING HEXAGONAL SILICON CARBIDE CRYSTALS, CONTROLLED BY A VACUUM FURNACE OF NEW DESIGN, FOR SILICON CARBIDE RECTIFIER PRODUCTION IS DESCRIBED. STUDIES OF METHODS AND MATERIALS OF DEVICE FABRICATION TO MEET VACUUM-TIGHT OPERATIONS ARE PRESENTED. ELECTRICAL CHARACTERISTICS OF A RECTIFIER ARE INCLUDED.
AD-275 540 DIV. 8

***CYBERNETICS**

THE LOGIC OF AN APPROACH TO THE ANALYSIS OF COMPLEX SYSTEMS.
AD-275 534 DIV. 30

***CYLINDRICAL BODIES**

THE DYNAMICS OF SPINNING BODIES AT LARGE ANGLES OF ATTACK.
AD-275 437 DIV. 12

*DATA PROCESSING SYSTEMS

METHOD OF DERIVING ELECTRONIC SIMULATED SIGNAL AND NOISE VOLTAGES FOR EXPERIMENTAL DEVELOPMENT OF INFRARED SIGNAL PROCESSING CIRCUITRY; INFRARED DETECTOR THEORY AND COMPLETE SIMULATOR SYSTEM WITH THEORY AND EXPERIMENT.
AD-275 384 DIV. 6

A PROGRESS REPORT ON AN INFORMATION RETRIEVAL PROGRAM FOR ELECTRICAL AND ELECTRONIC PROPERTIES OF SEMICONDUCTORS AND ELECTRIC INSULATING MATERIALS.
AD-275 439 DIV. 32

A PHASE-CHANNEL COMBINER WHICH AUTOMATICALLY COMBINES THE PHASE CHANNELS INTO ONE UNAMBIGUOUS CHANNEL AND DEPICTS THE ANGLES OF ARRIVAL OF THE RADIO ENERGY FROM RADIO-INTERFEROMETER TRACKED SATELLITES; DEVELOPED FOR THE NRL FENCE SPACE SURVEILLANCE SYSTEM.
AD-275 486 DIV. 6

AN AUTOMATED TECHNIQUE IS DESCRIBED THAT PROVIDES INFORMATION ON DATA SYSTEM FLOWS AND CHARACTERISTICS.
AD-275 499 DIV. 30

HYPOTHESIS- TESTING MODEL DESIGNED TO SIMULATE DATA ON THE BEHAVIOR OF SUBJECTS. BINARY CHOICE EXPERIMENTS MADE ON ARTIFICIAL SUBJECT THROUGH A COMPUTER PROGRAM AND ANALYSIS OF DATA OBTAINED.
AD-275 813 DIV. 28

A RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION OF TECHNIQUES AND EQUIPMENT CHARACTERISTICS OF PATTERN RECOGNITION SYSTEMS FOR APPLICATION TO GRAPHICAL DATA PROCESSING.
AD-275 836 DIV. 30

*DATA STORAGE SYSTEMS

READING AND WRITING SYSTEMS. A PHOTOMEMORY DEVICE FOR STORAGE AND RAPID RETRIEVAL OF INFORMATION. MILLIONS OF BITS STORED ON A SINGLE DATA PLATE MADE FROM A PHOTOGRAPHIC NEGATIVE. PHOTOMEMORY CAN FUNCTION INDEPENDENT OF COMPUTER.
AD-275 529 DIV. 30

A THEORETICAL STUDY OF THE APPLICATION OF NEW HIGH-RESOLUTION MICROWAVE X-BAND ELECTRON SPIN ECHO INSTRUMENTATION TO PARAMAGNETIC RELAXATION TIME AND INFORMATION STORAGE SYSTEMS.
AD-275 589 DIV. 25

*DATA TRANSMISSION SYSTEMS

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
AD-275 480 DIV. 5

THE STUDY OF DIGITAL DATA TRANSMISSION OVER MILITARY VOICE COMMUNICATION SYSTEMS.
AD-275 586 DIV. 5

*DECABORANES

PREPARATION, ISOLATION, AND CHARACTERIZATION OF HIGH-MOLECULAR-WEIGHT BORANES BETWEEN HEXABORANE-10 AND DECABORANE-14.
AD-275 784 DIV. 4

*DECOMPOSITION

THERMAL DECOMPOSITION OF AG COATED PB(N3)2 KINETIC THEORY OF THIS PROCESS IS BASED ON THE CATALYTIC EFFECT OF AG; WATER REVERSES THE EFFECT OF THE AG CATALYST.
AD-275 877 DIV. 4

THERMAL DECOMPOSITION OF NO2CL IN SHOCK WAVES; TEMPERATURE DEPENDENCE OF THE REACTION RATE AND EFFECTS OF INERT GASES.
AD-275 885 DIV. 4

*DEFORMATION

RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO, AM355, AND 4340 STEELS; B120 VCA TI ALLOY; RENE 41 NI-BASE ALLOY; AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
AD-275 395 DIV. 17

ALUMINUM BASE ALLOYS AL 1.7 AT .8 CU AND AL-5.3 AT .8 ZN; GUNIER-PRESTON ZONE FORMATION AND REVERSION.
AD-275 461 DIV. 17

DYNAMIC RESPONSE AND ULTIMATE STRENGTHS OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS.
AD-275 474 DIV. 15

SILVER BASE ALLOYS; EFFECTS OF SOLUTES ON THE OCCURRENCE OF STACKING FAULTS IN SILVER BASE ALLOYS; PRIMARY EFFECT OF ALLOYING CD, IN AND SN WITH AG IS TO INCREASE THE STACKING FAULT DENSITY IN FILINGS FROM PURE AG.
AD-275 809 DIV. 25

THEORY AND DETERMINATION OF INITIAL AND SUBSQUENT YIELD CURVES FOR 6061-T6 AL TUBULAR SECIMENS. YIELD SURFACES; CORNERS; NORMALITY, BAUSCHINGER AND ALLIED EFFECTS.
AD-275 730 DIV. 17

*DENSITY

A STUDY OF RADIATION FROM RE-ENTRY BODIES OF OPTICALLY-ACTIVE GASES; ANALYSIS OF BLUNT BODY, FLOW FIELDS AND THE RECOMBINATION REACTIONS OF AIR COUPLED WITH AERODYNAMICS OF THE FLOW.
AD-275 389 DIV. 25

ELECTRON DENSITY DISTRIBUTIONS IN PLASMAS ARE MEASURED BY USE OF LOW POWER MICROWAVE SIGNALS. THE PHASE AS A FUNCTION OF FREQUENCY OR AS A FUNCTION OF TIME IS SOLVED BY AN INTEGRAL EQUATION WHICH IS CONVERTED TO THE ELECTRON DENSITY PROFILE.
AD-275 512 DIV. 25

A WIDELY APPLICABLE TECHNIQUE FOR CALIBRATING AND ANALYZING ELECTRON BEAMS IS DEVELOPED.
AD-275 598 DIV. 8

A REVIEW OF THE THEORY AND THE EXAMINATION TECHNIQUES OF PROBES, MICROWAVES AND SPECTROSCOPY FOR PLASMAS.
AD-275 762 DIV. 25

*DESIGN

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED, AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS, VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

DYNAMIC RESPONSE AND ULTIMATE STRENGTHS OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS.
AD-275 474 DIV. 15

*DETECTION

A PHASE-CHANNEL COMBINER WHICH AUTOMATICALLY COMBINES THE PHASE CHANNELS INTO ONE UNAMBIGUOUS CHANNEL AND DEPICTS THE ANGLES OF ARRIVAL OF THE RADIO ENERGY FROM RADIO INTERFEROMETER TRACKED SATELLITES; DEVELOPED FOR THE NRL FENCE SPACE SURVEILLANCE SYSTEM.
AD-275 486 DIV. 6

*DETECTORS

FEASIBILITY OF USING THE SUPERCONDUCTIVE PROPERTIES OF CERTAIN METALLIC THIN FILM CONFIGURATIONS TO PERFORM ELECTRONIC FUNCTIONS SUCH AS RADIOFREQUENCY DETECTION, METALLIC CRYSTALS AS SUPERCONDUCTORS.
AD-275 472 DIV. 25

*DETONATION

DETONATION STUDIES ON PROPELLANTS AND HIGH EPLOSIVES. INITIATION MECHANISMS AND THE ROLE OF CARITATION ON THE PROPAGATION OF DETONATION IS EMPHASIZED. INITIATION OF DETONATION RESULTING FROM COMBUSTION INSTABILITIES.
AD-275 876 DIV. 10

*DEUTERONS

THE DEUTERON WIDTHS IN 1P-SHELL NUCLEI ARE ESTIMATED BY USING HARMONIC OSCILLATOR WAVEFUNCTIONS FOR THE SINGLE NUCLEON WAVE FUNCTION.
AD-275 768 DIV. 25

*DIELECTRIC PROPERTIES

MEASUREMENT OF DIELECTRIC CONSTANT AND LOSS TANGENT BY TRANSMISSION MEASUREMENT WITH A FREE-SPACE MICROWAVE INTERFEROMETER WITH SAMPLE AT 45-DEGREE INCIDENCE ANGLE. INITIAL CORRELATION OF THE INTERFEROMETER RESULTS WITH THOSE FROM A MICROWAVE DIELECTROMETER.
AD-275 425 DIV. 6

*DIELECTRICS

PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH POWER TRANSMISSION LINES IN A TRENCH COVERED BY COAL, COKE AND EARTH.
AD-275 390 DIV. 25

MEASUREMENT OF DIELECTRIC CONSTANT AND LOSS TANGENT BY TRANSMISSION MEASUREMENT WITH A FREE-SPACE MICROWAVE INTERFEROMETER WITH SAMPLE AT 45-DEGREE INCIDENCE ANGLE. INITIAL CORRELATION OF THE INTERFEROMETER RESULTS WITH THOSE FROM A MICROWAVE DIELECTROMETER.
AD-275 425 DIV. 6

A PROGRESS REPORT ON AN INFORMATION RETRIEVAL PROGRAM FOR ELECTRICAL AND ELECTRONIC PROPERTIES OF SEMICONDUCTORS AND ELECTRIC INSULATING MATERIALS.
AD-275 439 DIV. 32

THE DIFFRACTION OF MICROWAVES BY AN ELLIPTICAL DIELECTRIC CYLINDER.
AD-275 539 DIV. 25

A BIBLIOGRAPHY OF TECHNICAL ABSTRACTS RELATING TO THE DIELECTRICS OF HIGH FREQUENCY HEATING OF NON-CONDUCTING MATERIALS.
AD-275 647 DIV. 25

TRANSLATION OF RUSSIAN TEXTBOOK ON THE PHYSICAL, CHEMICAL, AND MECHANICAL PROPERTIES OF MATERIALS USED IN THE ENGINEERING OF RADIO AND ELECTRONIC EQUIPMENT, INCLUDING DIELECTRICS, CONDUCTORS, SEMICONDUCTORS, AND MAGNETIC MATERIALS
AD-275 736 DIV. 14

POLYETHYLENE TEREPHTHALATE CAPACITOR GAMMA-INDUCED PHOTOCONDUCTIVITY.
AD-275 799 DIV. 25

*DIFFERENCE EQUATIONS

THIS ANALYSIS WAS CARRIED OUT ON THE STABILITY OF FINITE DIFFERENCE APPROXIMATIONS TO SECOND ORDER LINEAR PARABOLIC DIFFERENTIAL EQUATIONS.
AD-275 390 DIV. 15

THEORY AND APPLICATION OF THE LYAPUNOV METHOD TO THE DEVELOPMENT OF A PROOF FOR A DELAY-DIFFERENTIAL SYSTEM.
AD-275 796 DIV. 15

*DIFFERENTIAL EQUATIONS

THIS ANALYSIS WAS CARRIED OUT ON THE STABILITY OF FINITE DIFFERENCE APPROXIMATIONS TO SECOND ORDER LINEAR PARABOLIC DIFFERENTIAL EQUATIONS.
AD-275 390 DIV. 15

CONCEPTS OF EXTREMAL FUNCTIONS DEFINED ON CERTAIN CLASSES OF DOMAINS.
AD-275 391 DIV. 15

PROPULSION REQUIREMENTS FOR A ROCKET POWERED HOVERING VEHICLE.
AD-275 482 DIV. 1

THE CONSTRUCTION OF RELATED EQUATIONS FOR THE ASYMPTOTIC THEORY OF LINEAR ORDINARY DIFFERENTIAL EQUATIONS ABOUT A TURNING POINT.
AD-275 708 DIV. 15

THEORY AND APPLICATION OF THE LYAPUNOV METHOD TO THE DEVELOPMENT OF A PROOF FOR A DELAY-DIFFERENTIAL SYSTEM.
AD-275 796 DIV. 15

*DIFFRACTION

A MATHEMATICAL ANALYSIS OF ACOUSTIC WAVE BEHAVIOR AS DIFFRACTED BY A REFRACTING WEDGE.
AD-275 798 DIV. 25

*DIFFUSION

DIFFUSION AND PHASE STUDIES OF METALS AND ALLOYS BY INTERNAL FRICTION TECHNIQUES.
AD-275 712 DIV. 17

*DIGITAL COMPUTERS

THE APPLICATION OF EQUATIONS TO COMPLEX REACTIONS IN EXHAUST GASES FOR USE IN DIGITAL COMPUTERS. THE FLOW OF THE GAS UNDERGOING FOUR REACTIONS IN THE DIVERGENT PORTION OF A NOZZLE IS CALCULATED.
AD-275 464 DIV. 9

AN AUTOMATED TECHNIQUE IS DESCRIBED THAT PROVIDES INFORMATION ON DATA SYSTEM FLOWS AND CHARACTERISTICS.
AD-275 499 DIV. 30

A COMPUTERIZED PROCEDURE - ORIENTED LANGUAGE PROGRAM FOR COMMAND CONTROL SYSTEMS.
AD-275 826 DIV. 30

A SIMULATED OPERATIONS RESEARCH MODEL OF A COMPLEX SYSTEM WITHOUT REGARD TO THE MECHANICAL ASPECTS.
AD-275 828 DIV. 26

***DIGITAL SYSTEMS**

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
AD-275 480 DIV. 5

A COMBINATION OF ANALOG AND DIGITAL COMPUTING TECHNIQUES IS PRESENTED AS A WAY TO INCREASE EFFECTIVENESS IN CALCULATING REAL-TIME OF AIRCRAFT THROUGH SIMULATION.
AD-275 649 DIV. 30

***DIODES**

THE TUNNEL DIODE: PREDICTION OF TUNNELING EFFECT BY THEORIES OF QUANTUM MECHANICS; FREQUENCY LIMITATIONS; EQUIVALENT CIRCUITS.
AD-275 760 DIV. 8

HIGH POWER SEMICONDUCTUR PHASE SHIFTING DEVICES
AD-275 821 DIV. 8

***DIPOLE ANTENNAS**

THE LONG; CYLINDRICAL ANTENNA: CURRENT AND ADMITTANCE.
AD-275 563 DIV. 8

***DIPOLE MOMENTS**

A DISCUSSION OF THE THEORY OF ELECTROMAGNETIC WAVE PROPAGATION IN A FLAT EARTH-IONOSPHERE SYSTEM FROM ABOVE SURFACE AND SUBSURFACE ANTENNAS.
AD-275 532 DIV. 5

***DISKS**

AN INVESTIGATION OF VISCOUS FLOW BETWEEN TWO PARALLEL DISKS ROTATING IN THE SAME DIRECTION WITH THE SAME VELOCITY; WHERE THE FLUID ENTERS THE SPACE BETWEEN THE TWO DISKS AT A CERTAIN RADIUS IN THE RADIAL DIRECTION.
AD-275 562 DIV. 9

***DISPLAY SYSTEMS**

SIMULATION TESTS OF THE STABILITY AND MANUAL CONTROLLABILITY OF THE TANDEM PROPELLER SUBMARINE. HUMAN ENGINEERING FOR THE DISPLAY AND CONTROL SYSTEMS OF DYNAMIC SUBMARINES.
AD-275 580 DIV. 31

DYNAMIC SIMULATION STUDIES OF COCKPIT PICTORIAL NAVIGATION DISPLAYS AS AN AID TO AIR TRAFFIC CONTROL IN A HIGH DENSITY AND MEDIUM-DENSITY TERMINAL AREAS.
AD-275 707 DIV. 1

A PRACTICAL COMMUTATING SYSTEM IS DESCRIBED WHICH IS CAPABLE OF SWITCHING 2 SETS OF 500 OR MORE GRID CONDUCTORS IN TIME RELATIONSHIP AT TV SCANNING RATES UNDER A CAPACITIVE LOAD WITH TV AM CAPABILITIES. SOLID DELAY LINES FOR TV DISPLAY SYSTEMS.
AD-275 784 DIV. 8

***DISSOCIATION**

AN ANALYSIS OF THE THERMODYNAMIC FUNCTIONS OF DISSOCIATING AIR IS GIVEN BASED UPON AN APPROXIMATELY GIVEN STATISTICAL SUM OF GAS MOLECULES.
AD-275 816 DIV. 25

***DISTRIBUTION**

CLIMATOLOGICAL DATA OF SCALAR WINDS; ZONAL AND MERIDIONAL WIND COMPONENTS; SEMIPLANAR WINDS AND WIND SHEAR AT 1 KM. ALTITUDE INTERVALS FOR FAIRBANKS, ALASKA.
AD-275 353 DIV. 2

***DISTRIBUTION THEORY**

A DIVERGENCE CRITERION FOR THE STATISTICAL COMPARISON OF COMMUNICATION SYSTEMS.
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***DIURNAL VARIATIONS**

A METHOD FOR FORECASTING STRONG AND GUSTY WINDS.
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***DOPPLER NAVIGATION**

INVESTIGATIONS OF APPROACH AND LANDING SYSTEMS; AIRPORT LIGHTING SYSTEMS; COMMUNICATIONS; DATA ACQUISITION AND PROCESSING SYSTEMS; FLIGHT SIMULATORS ARE SUMMARIZED.
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***DOPPLER RADAR**

PORCUPINE II B RADAR USED FOR DETECTION IRREGULARITIES IN THE DIELECTRIC CONSTANT OF THE LOWER AMOSPHERE CAUSED BY TURBULENCE; REDUCTION OF RANGE AMBIGUITIES THROUGH PULSE PHASE CODING; RADAR REQUIREMENTS FOR DETECTION OF CLEAR-AIR IRREGULARITIES.
AD-275 612 DIV. 6

***DOPPLER SYSTEMS**

A REVIEW OF DATA CONCERNING THE MEASUREMENT AND UTILIZATION OF THE DOPPLER SHIFT FROM ARTIFICIAL SATELLITE.
AD-275 393 DIV. 12

DETERMINATION OF THE FAR FIELD RADIATION CHARACTERISTICS OF LARGE ANTENNAS FROM NEAR FIELD MEASUREMENTS INVOLVING THE TRANSVERSE DOPPLER PATTERN.
AD-275 724 DIV. 8

***DOPPLER TRACKING**

ANALOG TECHNIQUES FOR A DOPPLER TRACKING SYSTEM ARE EXPLORED AND A UNIQUE ANALOG COMPUTER CIRCUIT WAS DEVELOPED.
AD-275 616 DIV. 30

***DRAG**

THE SLOW STEADY FLOW OF A VISCOUS INCOMPRESSIBLE ELECTRICALLY CONDUCTING FLUID ABOUT A UNIFORMLY MAGNETIZED SPHERE.
AD-275 462 DIV. 25

***DRIFT SIGNALS**

ELECTROHYDRODYNAMIC POWER GENERATION BY AN ELECTROSTATIC DEVICE OPERATING ON THE PRINCIPLE OF A VAN DE GRAAFF GENERATOR WITH GAS IONIZED BY A CORONA DISCHARGE.
AD-275 604 DIV. 7

***DUCTED FANS**

RESULTS OF WIND TUNNEL TESTS OF A FULL SCALE FUSELAGE MOUNTED TIP TURBINE DRIVEN LIFT FAN INCLUDE BASIC AIRPLANE PERFORMANCE (FAN OFF); FAN POWERED AIRCRAFT PERFORMANCE; AND FAN AERODYNAMIC PERFORMANCE.
AD-275 711 DIV. 9

***DYNAMICS**

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***ELECTRON TUBES**

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AD-275 401 DIV. 14

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AD-275 401 DIV. 14

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***ELECTROSTATIC GENERATOR**

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INVESTIGATION OF FUNDAMENTAL PROCESSES OF ENERGY CONVERSION.
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A DIVERGENCE CRITERION FOR THE STATISTICAL COMPARISON OF COMMUNICATION SYSTEMS.
AD-275 467 DIV. 8

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
AD-275 480 DIV. 5

THE STUDY OF DIGITAL DATA TRANSMISSION OVER MILITARY VOICE COMMUNICATION SYSTEMS.
AD-275 586 DIV. 5

A BIBLIOGRAPHY OF 350 ABSTRACTED PAPERS, REPORTS, AND BOOKS DEALING WITH PROBLEMS OR TOOLS OF CODING THEORY. CONTAINS GENERAL EXPOSITIONS OF CODING, MATHEMATICAL AND THEORETICAL RESULTS, NEW APPROACHES, AXIOMATIC STUDIES, APPLICATIONS, DECODING PROCEDURES, ROUND-, NON-BINARY CODES, ETC.
AD-275 715 DIV. 30

*ERYTHROCYTES

OBSERVATIONS MADE TO DESCRIBE THE LIFE SPAN OF ERYTHROCYTES IN CONTROL GOLDEN HAMSTERS, IN HAMSTERS IN HIBERNATION, AND IN HAMSTERS AWAKE IN COLD BEFORE AND AFTER HIBERNATION.
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*EXHAUST GASES

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THE APPLICATION OF EQUATIONS TO COMPLEX REACTIONS IN EXHAUST GASES FOR USE IN DIGITAL COMPUTERS. THE FLOW OF THE GAS UNDERGOING FOUR REACTIONS IN THE DIVERGENT PORTION OF A NOZZLE IS CALCULATED.
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TRACER METHOD FOR SOLID PROPELLANTS. SPECTROGRAPHIC DETECTION OF TRACER ELEMENTS IN SOLID PROPELLANT ROCKET EXHAUSTS.
AD-275 808 DIV. 10

*EXPANDED PLASTICS

SUMMARY OF ALL STATIC AND DYNAMIC TESTS RELATED TO HARDENED FOAM RADOME DESIGN CONDUCTED AT LINCOLN LABORATORY. NUCLEAR BLAST RESISTANCE OF RADOMES FABRICATED FROM A MODIFIED POLYESTER, POLYURETHANE RIGID FOAM.
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*EXPLOSIVE FORMING

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*EXPLOSIVES

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AD-275 876 DIV. 10

*EXPOSURE

BIOSYNTHESIS OF FATTY ACIDS BY ACETATE METABOLISM BY ADIPOSE TISSUE, EPIDIDYMAL FAT PADS AND THE LIVER. EFFECTS OF COLD STRESSES ON LIPOGENESIS AND THE RELATED INFLUENCE OF GLUCOSE ON THE LIPOGENIC ACTIVITY.
AD-275 864 DIV. 16

BLOOD VALUES OF ORGANS AND TISSUES OF RATS EXPOSED TO COLD FOR VARIOUS PERIODS OF TIME. THE EFFECTS ON RED CELL VOLUME, PLASMA VOLUME, TOTAL BLOOD VOLUME AND HEMATOCRIT OF HEART BLOOD.
AD-275 870 DIV. 16

*EXTREMELY LOW FREQUENCY

RADIO PROPAGATION, COMMUNICATION TECHNIQUES, COMMUNICATION SYSTEMS, SURVEILLANCE TECHNIQUES, ANTENNAS: QUARTERLY PROGRESS REPORT DISCUSSES THE ABOVE TOPICS.
AD-275 470 DIV. 8

*EXTRUSION

TUNGSTEN SHEET ROLLING PROGRAM. EFFECTS OF ROLLING AND ANNEALING ON MICROSTRUCTURE, TENSILE PROPERTIES, AND BEND TRANSITION TEMPERATURES.
AD-275 399 DIV. 26

*EYE

OPACITIES IN RABBIT EYES INDUCED BY CONTINUOUS OR PULSED-WAVE RADIATION. ANTERIOR CORTEX OPACITIES AT 8.236, 9.375, AND 10.050 MC, AND POSTERIOR CORTEX OPACITIES AT 2450 MC. DECREASE IN LENS ASCORBIC ACID AND GLUTATHIONE. NON-THERMAL EFFECT DISTINGUISHED FROM USUAL THERMAL EFFECT.
AD-275 840 DIV. 16

***FATIGUE (MECHANICS)**

A QUANTITATIVE THEORY OF CUMULATIVE DAMAGE IN FATIGUE BASED ON THE ESTIMATION OF THE IRREVERSIBLE GROWTH OF A DOMINANT CRACK PRESUMED RESPONSIBLE FOR THE ULTIMATE CATASTROPHIC FAILURE.
AD-275 383 DIV. 25

A CURRENT LISTING OF SELECTED ABSTRACTS OF DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
AD-275 394 DIV. 17

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***FATTY ACIDS**

BIOSYNTHESIS OF FATTY ACIDS BY ACETATE METABOLISM BY ADIPOSE TISSUE, EPIDIDYMAL FAT PADS AND THE LIVER. EFFECTS OF COLD STRESSES ON LIPOGENESIS AND THE RELATED INFLUENCE OF GLUCOSE ON THE LIPOGENIC ACTIVITY.
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AD-275 868 DIV. 16

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PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH POWER TRANSMISSION LINES IN A TRENCH COVERED BY COAL, COKE AND EARTH.
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ELECTROHYDRODYNAMIC POWER GENERATION BY AN ELECTROSTATIC DEVICE OPERATING ON THE PRINCIPLE OF A VAN DE GRAAFF GENERATOR WITH GAS IONIZED BY A CORONA DISCHARGE.
AD-275 404 DIV. 7

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AD-275 472 DIV. 25

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AD-275 862 DIV. 16

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AD-275 867 DIV. 16

***FERRITE CORES**

PHYSICAL AND MATHEMATICAL MODELS FOR FLUX SWITCHING IN FERRITE MULTIPATH CORES.
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***FERROMAGNETIC MATERIALS**

ELASTIC AND PLASTIC PROPERTY MEASUREMENTS ON METALS; CO, CU, NI, FE, AND FE-SI ALLOY.
AD-275 449 DIV. 17

***FILAMENT WOUND CONSTRUCTION**

A BIBLIOGRAPHY OF 89 ABSTRACTED REPORTS OF RECENT (1959-1961) LITERATURE ON NON-DESTRUCTIVE TESTING OF ROCKET MOTOR CASES. THE LIST IS LIMITED TO STRUCTURES WOUND FROM WIRE AND FROM FILAMENTS OF GLASS FIBER-RESIN COMPOSITES.
AD-275 587 DIV. 12

RESIN SYSTEMS FOR FILAMENT-WOUND PRESSURE HULL STRUCTURES; FIBERGLASS REINFORCED COMPOSITES; PROGRAM OUTLINE FOR DEVELOPMENT.
AD-275 860 DIV. 14

***FIRES**

FIRES STUDIES OF AIR FLOW; COMBUSTION RATES, AND ACCELERATION.
AD-275 418 DIV. 10

***FIRING CIRCUITS**

DEVELOPMENT OF A TWO-CONDUCTOR SHIELDED CABLES CONNECTOR FOR USE IN MISSILE FIRING CIRCUITS.
AD-275 856 DIV. 12

***FLAME PROPAGATION**

THEORY OF FLAMMABILITY LIMITS; EFFECTS OF TEMPERATURE AND DILUTION ON FLAMMABILITY OF CH4-O MIXTURES; EXTINCTION OF PREMIXED FLAMES BY FINE AL2O3 AND SIO2 POWDERS; ELECTROSTATIC DUST DISPERSER DESIGN.
AD-275 642 DIV. 10

***FLAMES**

FIRES STUDIES OF AIR FLOW; COMBUSTION RATES, AND ACCELERATION.
AD-275 418 DIV. 10

THEORY OF FLAMMABILITY LIMITS; EFFECTS OF TEMPERATURE AND DILUTION ON FLAMMABILITY OF CH4-O MIXTURES; EXTINCTION OF PREMIXED FLAMES BY FINE AL2O3 AND SIO2 POWDERS; ELECTROSTATIC DUST DISPERSER DESIGN.
AD-275 642 DIV. 10

***FLIGHT INSTRUMENTS**

THIS AEROSPACE INSTRUMENTATION HANDBOOK COVERS ON-BOARD RECORDING; RADIATION TECHNIQUES; TRANSDUCERS; SIGNAL CONDITIONING EQUIPMENT; MODULATION; TRACKING, RECEIVING, AND DATA PROCESSING; AND BIOASTRONAUTICS AND BIOINSTRUMENTATION.
AD-275 727 DIV. 1

***FLUID FLOW**

THE APPLICATION OF FLUID DYNAMICS TO SHIP HULLS.
AD-275 446 DIV. 9

THE SLOW STEADY FLOW OF A VISCOUS INCOMPRESSIBLE ELECTRICALLY CONDUCTING FLUID ABOUT A UNIFORMLY MAGNETIZED SPHERE.
AD-275 462 DIV. 25

FOUNDATIONAL RESEARCH TASK OF NAVAL ORDNANCE LABORATORY SOLID STATE PHYSICS, LIQUID STATE STUDIES, NUCLEAR PHYSICS ELECTRICITY AND MAGNETISM, GASES AT HIGH PRESSURES AND TEMPERATURES, DETONATION, AND CHEMISTRY OF COMPOUNDS.
AD-275 485 DIV. 25

AN INVESTIGATION OF VISCOUS FLOW BETWEEN TWO PARALLEL DISKS ROTATING IN THE SAME DIRECTION WITH THE SAME VELOCITY, WHERE THE FLUID ENTERS THE SPACE BETWEEN THE TWO DISKS AT A CERTAIN RADIUS IN THE RADIAL DIRECTION.
AD-275 562 DIV. 9

AN INVESTIGATION OF POSSIBLE INTERACTION BETWEEN ELECTRIC FIELDS AND FLUIDS AS WELL AS EFFECTS UPON HEAT TRANSFER.
AD-275 848 DIV. 9

***FLUORIDES**

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AD-275 633 DIV. 4

***FLYING PLATFORMS**

PROPULSION REQUIREMENTS FOR A ROCKET POWERED HOVERING VEHICLE.
AD-275 482 DIV. 1

***FOILS**

PREPARATION OF HIGH PURITY BE SINGLE CRYSTALS AND FOILS AND A STUDY OF THEIR DEFORMATION AND FRACTURE CHARACTERISTICS. ZONE MELTING, AND COMPRESSION TENSION AND ELECTRICAL RESISTIVITY MEASUREMENTS.
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*MESONS

MULTINUCLEON CAPTURE OF K(-) MESONS AND SOME ASSOCIATED PROBLEMS OF THE K(-) CAPTURE PROCESS.
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EXPERIMENTAL RESULTS OBTAINED BY MEASURING SPURIOUS EMISSION POWER OF MICROWAVES BY THE FIXED PROBE METHOD (WHICH MEASURES BY PROBES LOCATED ON THE WAVEGUIDE BOUNDARY) AND THE MOVABLE PROBE METHOD (WHICH MEASURES BY MOVABLE PROBES THAT SCAN A PLANE TRANSVERSE TO THE DIRECTION OF PROPAGATION).
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***MILITARY COMMUNICATIONS**

THE STUDY OF DIGITAL DATA TRANSMISSION OVER MILITARY VOICE COMMUNICATION SYSTEMS.
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***MILITARY PERSONNEL**

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***MOLECULAR WEIGHT**

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***MOLECULES**

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AD-275 509 DIV. 20

***MOLYBDENUM**

A CURRENT LISTING OF SELECTED ABSTRACTS OF DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
AD-275 394 DIV. 17

RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO! AM355! AND 4340 STEELS! B120 VCA TI ALLOY! RENE 41 NI-BASE ALLOY! AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
AD-275 395 DIV. 17

THE EFFECTS OF THE CURRENT CARRYING CAPACITY OF SUPERCONDUCTORS UPON THE DIRECTION OF EXTERNALLY PRODUCED MAGNETIC FIELDS.
AD-275 396 DIV. 25

***MOLYBDENUM ALLOYS**

RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO! AM355! AND 4340 STEELS! B120 VCA TI ALLOY! RENE 41 NI-BASE ALLOY! AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
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***MOLYBDENUM COMPOUNDS**

METALORGANIC COMPOUNDS OF MO AND W COMPLEX COMPOUNDS WITH EITHER AN M-C OR M-P BOND! AMINES, PYRIDINES.
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***MONITORS**

MEANS THAT CONSIDER COST AND RELIABILITY TO DETERMINE WHETHER MONITORING OF NAVAL WEAPONS IN SERVICE IS JUSTIFIED! THIS IS FOR THE CONSIDERATION OF WEAPON DESIGNERS.
AD-275 776 DIV. 22

***MOON**

CONFERENCE HELD TO DISCUSS PLANETARY ATMOSPHERES OF MOON, VENUS, AND MARS, AND GENERAL PHENOMENA ON SOLAR FLARES.
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*MULTIPLEX TRANSMISSION

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
AD-279 480 DIV. 5

*MOUNTAINS

THE TURBULENT WIND FIELD IN THE LEE OF MOUNTAIN RIDGES AND TREE LINES AS STUDIED BY TRACKING BALLOONS WITH THEODOLITES.
AD-279 611 DIV. 2

*MULTICHANNEL TELEPHONE SYSTEMS

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AD-279 480 DIV. 5

***NAVAL EQUIPMENT**

INFORMATION ON BIMHAB: (BUWEPS-INDUSTRY MATERIAL RELIABILITY ADVISORY BOARD) IS PROVIDED. STUDIES ON SAFETY: RELIABILITY: AVAILABILITY: SUITABILITY OF NAVAL WEAPONS SYSTEMS MATERIALS. RECOMMENDATION OF PERTINENT DESIGN REQUIREMENTS. SYMPOSIUM ON MATERIALS FOR NAVAL AIRCRAFT AND MISSILES.
AD-275 781 DIV. 12

***NAVAL ORDNANCE**

MEANS THAT CONSIDER COST AND RELIABILITY TO DETERMINE WHETHER MONITORING OF NAVAL WEAPONS IN SERVICE IS JUSTIFIED: THIS IS FOR THE CONSIDERATION OF WEAPON DESIGNERS.
AD-275 776 DIV. 22

***NAVAL RESEARCH LABORATORIES**

PROCEEDINGS OF THE NAVY LABORATORY MICROELECTRONICS PROGRAM CONFERENCES. REPORTS ON THE PROGRAMS AND PLANS OF NAVY LABORATORIES AND NAVY CONTRACTORS IN MICROELECTRONICS.
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***NAVIGATION COMPUTERS**

AN APPLICATION OF DIGITAL COMPUTER ANALYSIS TO A HYPERBOLIC PHASE NAVIGATION SYSTEM ON GEODETIC DATA CONVERSION.
AD-275 624 DIV. 19

***NEODYMIUM**

EQUILIBRIUM PHASE DIAGRAMS FOR THE PRASEODYMIUM-NEODYMIUM ALLOY SYSTEM BY METALLOGRAPHIC, THERMAL ANALYTICAL, HARDNESS AND DENSITY DETERMINATIONS.
AD-275 747 DIV. 17

***NERVOUS SYSTEM**

SHIVERING TESTS WERE MADE ON THIRTY-FIVE CATS TO DETERMINE THEIR ABILITY TO ' 'SE RECTAL TEMPERATURE FROM 32 DEGREES ? BEFORE AND AFTER BILATERAL LESIONS WERE TWO DIFFERENT SECTIONS OF THE BRAIN. .SIONS DID NOT IMPAIR SHIVERING RESPONSE.
AD-275 865 DIV. 16

***NEUTRINO CROSS SECTIONS**

NEUTRON PARTIAL CROSS SECTIONS (N,2N) ARE MEASURED FOR ZN-64: BR-79: AG-107: SB-121: PR-141: AND NB-93.
AD-275 551 DIV. 20

***NEVADA**

A METHOD FOR FORECASTING STRONG AND GUSTY WINDS.
AD-275 387 DIV. 2

***NICKEL ALLOYS**

DESIGN CONTINUED ON A 40 IN. ROCKET MOTOR CASE FOR SOLID ROCKET PROPELLANTS. FABRICATION OF A 20 IN. TEST CASE FROM TI-13V-11CR-3AL ALLOYS: AND 20% NI-STEEL WAS DISCUSSED.
AD-275 377 DIV. 27

A CURRENT LISTING OF SELECTED ABSTRACTS OF DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
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RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO: AM355: AND 4340 STEELS: 8120 VCA TI ALLOY: RENE 41 NI-BASE ALLOY: AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
AD-275 395 DIV. 17

DATA CONCERNING AGING: STRAIN AGING AND HEAT TREATMENT OF STEEL: STAINLESS STEEL AND INCONEL: ALUMINIZING TESTS OF TI ALLOY AND UDIMET: MECHANICAL PROPERTIES OF WELDED JOINTS OF TI ALLOY FOILS.
AD-275 839 DIV. 17

***NIOBIUM**

THE EFFECTS OF INTERSTITIAL O AND H ON THE TENSILE AND NOTCH TENSILE PROPERTIES OF NB: TA: TA-10W: AND F-48NB ALLOYS. REACTION KINETICS IN THE TA-H SYSTEM.
AD-275 379 DIV. 17

A CURRENT LISTING OF SELECTED ABSTRACTS OF DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
AD-275 394 DIV. 17

***NIOBIUM ALLOYS**

PACK-CEMENTED SILICONIZED AND FLAME-SPRAYED NI COATINGS FOR PROTECTING V-NB BASE ALLOYS IN AIR AT 2000 F AND ABOVE. SELF-HEALING OF DEFECTS. OXIDATION TEST RESULTS ON DEFORMED SPECIMENS.
AD-275 368 DIV. 17

THE EFFECTS OF INTERSTITIAL O AND H ON THE TENSILE AND NOTCH TENSILE PROPERTIES OF NB: TA: TA-10W: AND F-48NB ALLOYS. REACTION KINETICS IN THE TA-H SYSTEM.
AD-275 379 DIV. 17

***NITROGEN**

THE EFFECT OF ORIFICE DIAMETER AND MOLECULAR WEIGHT ON SECONDARY GAS INJECTION IN ROCKET MOTOR NOZZLES.
AD-275 463 DIV. 12

GRAPHICAL AND TABULAR FORMS OF THERMODYNAMIC DATA ON OXYGEN AND NITROGEN: INCLUDING VISCOSITY: VAPOR DEW-POINT: LIQUID BUBBLE POINT: VAPOR-LIQUID EQUILIBRIUM RATIOS: THERMAL CONDUCTIVITY: DENSITY: AND PRANDTL NUMBER FROM 10 TO 10,000 PSIA AND -330 TO 900 F.
AD-275 728 DIV. 4

***NITROGEN COMPOUNDS**

MERCAPTOETHYL COMPOUNDS: SYNTHESIS OF HETEROCYCLES INCLUDING PYRIDINES: PYRIMIDINES, PHTHALAZINES: QUINAZOLINE: CINNOLINE: QUINOXALINES: PYRIDAZINE AND BENZIMIDAZOLE AS RADIOPROTECTIVE DRUGS.
AD-275 607 DIV. 4

THERMAL DECOMPOSITION OF NO2CL IN SHOCK WAVES: TEMPERATURE DEPENDENCE OF THE REACTION RATE AND EFFECTS OF INERT GASES.
AD-275 885 DIV. 4

***NOISE (RADIO)**

A STUDY OF THE PROBLEM OF CONTROLLING INTERSYMBOL INTERFERENCE AND ADDITIVE NOISE INTERFERENCE IN A CERTAIN TYPE OF PULSE TRANSMISSION SYSTEM.
AD-275 564 DIV. 8

RANDOM PROCESSES FOR SPECTRAL ANALYSIS OF FREQUENCY MODULATED WAVES WHERE THERE IS A VARIATION BY BAND-PASS NOISE POWER DENSITY SPECTRA AS A FUNCTION OF THE MODULATION PARAMETERS.
AD-275 761 DIV. 25

***NON-DESTRUCTIVE TESTING**

AN INTERMITTENT SCAN TELEVISION ON X-RAY IMAGE SYSTEM FOR NON-DESTRUCTIVE TESTING OF SOLID PROPELLANT ROCKET CASE WALLS AND WELDMENTS. EVALUATION DATA OF SMALL-DIAMETER TELEVISION CAMERA PICK-UP TUBES FOR DIRECT X-RAY SENSING.
AD-275 434 DIV. 30

***NUCLEAR MAGNETIC RESONANCE**

FOUNDATIONAL RESEARCH TASK OF NAVAL ORDNANCE LABORATORY, SOLID STATE PHYSICS: LIQUID STATE STUDIES: NUCLEAR PHYSICS ELECTRICITY AND MAGNETISM: GASES AT HIGH PRESSURES AND TEMPERATURES: DETONATION: AND CHEMISTRY OF COMPOUNDS.
AD-275 485 DIV. 25

NUCLEAR MAGNETIC RESONANCE RATE GYRO PERFORMANCE: STEADY STATE NUCLEAR MAGNETIZATION: GYRO DIRECTIONAL DRIFT: NUCLEAR MAGNETIZATION NOISE: RAPID PASSAGE GYRO.
AD-275 819 DIV. 25

***NUCLEI**

THE DEUTERON WIDTHS IN 1P-SHELL NUCLEI ARE ESTIMATED BY USING HARMONIC OSCILLATOR WAVE-FUNCTIONS FOR THE SINGLE NUCLEON WAVE FUNCTION.
AD-275 768 DIV. 25

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A MATHEMATICAL ANALYSIS OF GRAPHS WITH RESPECT TO A PARTIAL ORDERING OF SETS.
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AN ESTIMATE OF THE 1970-75 ENVIRONMENT FOR AIR-TRAFFIC CONTROL.
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AN ANALYSIS OF VARIOUS FIELDS OF TECHNOLOGY AND INTELLIGENCE BY A COMPUTER ROUTINE.
AD-275 827 DIV. 30

A COMPREHENSIVE THEORY PERTAINING TO LEADERSHIP, ORGANIZATION AND INTERPERSONAL RELATIONS WITH RESPECT TO PRODUCTION EFFICIENCY: WASTE PERFORMANCE AND ABSENCE RATES.
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***OPERATORS (MATHEMATICS)**

A FUNCTIONAL ANALYSIS OF BOUNDARY VALUES OF ANALYTIC VECTOR VALUED FUNCTIONS IS PRESENTED.
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ANALYTIC FUNCTIONS OF CAUCHY INTEGRAL EQUATIONS ARE PRESENTED.
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FUNCTIONAL ANALYSIS IS USED TO SATISFY LINEAR DIFFERENCE-INTEGRAL EQUATIONS.
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***OPHTHALMOLOGY**

OPACITIES IN RABBIT EYES INDUCED BY CONTINUOUS OR PULSED-WAVE RADIATION. ANTERIOR CORTEX OPACITIES AT 8,236, 9,375, AND 10,050 MC, AND POSTERIOR CORTEX OPACITIES AT 2450 MC. DECREASE IN LENS ASCORBIC ACID AND GLUTATHIONE. NON-THERMAL EFFECT DISTINGUISHED FROM USUAL THERMAL EFFECT.
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***OPTICAL FILTERS**

THE THEORY OF SPATIAL FILTERING IS REVIEWED AND THE PARAMETERS SIGNIFICANT IN THE DESIGN OF AN EXPERIMENTAL FILTERING APPARATUS ARE DISCUSSED.
AD-275 817 DIV. 25

***OPTICS**

THE THEORETICAL EFFICIENCY OF VARIOUS PUMPING POWER SYSTEMS THAT WERE ADOPTED IN OPTICAL MASERS IS STUDIED.
AD-275 479 DIV. 25

FOUNDATIONAL RESEARCH TASK OF NAVAL ORDNANCE LABORATORY, SOLID STATE PHYSICS: LIQUID STATE STUDIES: NUCLEAR PHYSICS ELECTRICITY AND MAGNETISM: GASES AT HIGH PRESSURES AND TEMPERATURES: DETONATION: AND CHEMISTRY OF COMPOUNDS.
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***ORIFICES**

THE EFFECT OF ORIFICE DIAMETER AND MOLECULAR WEIGHT ON SECONDARY GAS INJECTION IN ROCKET MOTOR NOZZLES.
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***OSCILLATION**

MEASUREMENT OF THE PRESSURE FLUCTUATIONS IN THE TEST SECTION OF A 1-FOOT TRANSONIC WIND TUNNEL IN THE FREQUENCY RANGE FROM 5 TO 1250 CPS.
AD-275 400 DIV. 30

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A PRACTICAL SYSTEM TO MEASURE THE PRESSURE OF A LASER PULSE ON A REFLECTING SURFACE, AND HENCE THE TOTAL ENERGY OF THE PULSE.
AD-275 460 DIV. 25

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***OXIDES**

ZIRCONIA - MAGNESIA REFRACTORIES AND BORON - SILICON MIXTURES - CHEMICAL ANALYSIS.
AD-275 506 DIV. 4

PREPARATION OF OXOVANADIUM COMPLEXES OF PERCHLORATES AND OXYCHLORIDES COMBINED WITH PYRIDINES, PHENYL PHOSPHINE, PHENYL ARSENIDES AND METHYL SULPHIDES. MOLECULAR STRUCTURE DETERMINATION BY IR SPECTROSCOPY, MAGNETIC MOMENTS AND CONDUCTANCE MEASUREMENTS.
AD-275 608 DIV. 4

***OXYCHLORIDES**

THERMAL DECOMPOSITION OF NO2CL IN SHOCK WAVES; TEMPERATURE DEPENDENCE OF THE REACTION RATE AND EFFECTS OF INERT GASES.
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***OXYGEN**

THEORY OF FLAMMABILITY LIMITS; EFFECTS OF TEMPERATURE AND DILUTION ON FLAMMABILITY OF CH4-O MIXTURES; EXTINCTION OF PREMIXED FLAMES BY FINE AL2O3 AND SIO2 POWDERS; ELECTROSTATIC DUST DISPERSER DESIGN.
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GRAPHICAL AND TABULAR FORMS OF THERMODYNAMIC DATA ON OXYGEN AND NITROGEN, INCLUDING VISCOSITY, VAPOR DEW-POINT, LIQUID BUBBLE POINT, VAPOR-LIQUID EQUILIBRIUM RATIOS, THERMAL CONDUCTIVITY, DENSITY, AND PRANDTL NUMBER FROM 10 TO 10,000 PSIA AND -330 TO 500 F.
AD-275 728 DIV. 4

***PARABOLIC ANTENNAS**

THE NEAR-FIELD BEHIND A PARABOLIC ANTENNA IS ANALYZED FOR ELECTROMAGNETIC RADIATION HAZARDS. GEOMETRICAL THEORY OF DIFFRACTION IS USED.
AD-275 599 DIV. 8

***PARAMAGNETIC RESONANCE**

PARAMAGNETIC MASER OSCILLATOR ANALYSIS.
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A THEORETICAL STUDY OF THE APPLICATION OF NEW HIGH-RESOLUTION MICROWAVE X-BAND ELECTRON SPIN ECHO INSTRUMENTATION TO PARAMAGNETIC RELAXATION TIME AND INFORMATION STORAGE SYSTEMS.
AD-275 589 DIV. 25

AN INVESTIGATION OF THE PARAMAGNETIC IONS WITH LATTICE VIBRATIONS IN IONIC CRYSTALS AND THE THEORY OF RELAXATION EFFECTS IN EXCITED STATES IN RUBIES AND LANTHANIDES.
AD-275 763 DIV. 25

***PARAMETRIC AMPLIFIERS**

A BIBLIOGRAPHY OF MASERS, LASERS, AND ERASERS; COVERING THE PERIOD 1959 TO PRESENT CONTAINING BIBLIOGRAPHIES, BOOKS, AND ARTICLES SPECIFICALLY APPLICABLE TO USSR.
AD-275 440 DIV. 25

***PARTIAL DIFFERENTIAL EQUATIONS**

THIS ANALYSIS WAS CARRIED OUT ON THE STABILITY OF FINITE DIFFERENCE APPROXIMATIONS TO SECOND ORDER LINEAR PARABOLIC DIFFERENTIAL EQUATIONS.
AD-275 350 DIV. 15

THE APPLICATION OF FLUID DYNAMICS TO SHIP HULLS.
AD-275 446 DIV. 9

RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION.
AD-275 473 DIV. 15

A METHODS OF VIRTUAL DISPLACEMENTS FOR ELECTROMECHANICAL SYSTEMS, INCLUDING THOSE WHICH CONTAIN PIEZOELECTRIC CRYSTALS AND MAGNETOSTRICTION ELEMENTS...SONAR SIGNALS...TRANSDUCERS.
AD-275 484 DIV. 25

FOUNDATIONAL RESEARCH TASK OF NAVAL ORDNANCE LABORATORY SOLID STATE PHYSICS, LIQUID STATE STUDIES, NUCLEAR PHYSICS ELECTRICITY AND MAGNETISM, GASES AT HIGH PRESSURES AND TEMPERATURES, DETONATION, AND CHEMISTRY OF COMPOUNDS.
AD-275 485 DIV. 25

A SPECIALIZED TREATMENT OF THE INITIAL-BOUNDARY VALUE PROBLEM FOR A CLASS OF LINEAR HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS OF THE SECOND ORDER BY USE OF FUNCTIONAL ANALYSIS.
AD-275 703 DIV. 15

A PRESENTATION OF CERTAIN SINGULAR ELLIPTICAL PARTIAL DIFFERENTIAL EQUATIONS RELATED TO WEINSTEIN'S EQUATION OF GENERALIZED AXIALLY SYMMETRIC POTENTIAL THEORY.
AD-275 769 DIV. 15

***PARTICLE ACCELERATORS**

A COLLECTION OF THEORETICAL AND EXPERIMENTAL STUDIES ON LINEAR ELECTRON ACCELERATORS, BETATRONS AND SYNCHOTRONS, AND ION SOURCES FOR CYCLOTRONS IN THE USSR.
AD-275 737 DIV. 20

***PARTICLE BEAMS**

A COLLECTION OF THEORETICAL AND EXPERIMENTAL STUDIES ON LINEAR ELECTRON ACCELERATORS, BETATRONS AND SYNCHOTRONS, AND ION SOURCES FOR CYCLOTRONS IN THE USSR.
AD-275 737 DIV. 20

***PARTICLE TRAJECTORIES**

A COLLECTION OF THEORETICAL AND EXPERIMENTAL STUDIES ON LINEAR ELECTRON ACCELERATORS, BETATRONS AND SYNCHOTRONS, AND ION SOURCES FOR CYCLOTRONS IN THE USSR.
AD-275 737 DIV. 20

***PARTICLES**

SCATTERING OF PARTICLES BY A POTENTIAL FIELD IS DESCRIBED BY A QUANTUM MECHANICAL APPROACH TO WAVE FUNCTIONS.
AD-275 386 DIV. 25

VELOCITY AND THERMAL BEHAVIOR OF PARTICLES EJECTED FROM SMALL ROCKET ATTACHED TO HYPERVELOCITY VEHICLE. ANALYSIS OF PARTICLE CONTINUUM RADIATION. STUDY OF SMALL CESIUM-NITRATE ALUMINUM SOLID PROPELLANT ROCKET ATTACHED TO ICBM REENTRY VEHICLE. RADIATIVE PROPERTIES OF EXHAUST PRODUCTS OF ROCKET SYSTEM.
AD-275 413 DIV. 25

RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION.
AD-275 473 DIV. 15

AN EXPERIMENTAL METHOD FOR CALCULATING ELEMENTARY PARTICLE CONSTANTS IS DESCRIBED.
AD-275 843 DIV. 25

***PERTURBATION THEORY**

THE APPLICATION OF FLUID DYNAMICS TO SHIP HULLS.
AD-275 446 DIV. 9

THE SLOW STEADY FLOW OF A VISCOUS INCOMPRESSIBLE ELECTRICALLY CONDUCTING FLUID ABOUT A UNIFORMLY MAGNETIZED SPHERE.
AD-275 462 DIV. 25

***PHASE MEASUREMENT**

A PHASE-CHANNEL COMBINER WHICH AUTOMATICALLY COMBINES THE PHASE CHANNELS INTO ONE UNAMBIGUOUS CHANNEL AND DEPICTS THE ANGLES OF ARRIVAL OF THE RADIO ENERGY FROM RADIO INTERFEROMETER TRACKED SATELLITES; DEVELOPED FOR THE NRL FENCE SPACE SURVEILLANCE SYSTEM.
AD-275 486 DIV. 6

***PHASE SHIFTERS**

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED, AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS, VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

HIGH POWER SEMICONDUCTOR PHASE SHIFTING DEVICES
AD-275 821 DIV. 8

***PHASE STUDIES**

ALUMINUM BASE ALLOYS AL 1.7 AT .% CU AND AL-5.3 AT .% ZN; GUNIER-PRESTON ZONE FORMATION AND REVERSION.
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EQUILIBRIUM PHASE DIAGRAMS FOR THE PRASEODYMIUM-NEODYMIUM ALLOY SYSTEM BY METALLOGRAPHIC, THERMAL ANALYTICAL, HARDNESS AND DENSITY DETERMINATIONS.
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W-C EQUILIBRIUM SYSTEM; SOLID-SOLUBILITY LIMIT WAS RESOLVED AND IS PRESENTED; C SOLUBILITY ATTAINS A MAXIMUM OF 0.3 AT. % C AT THE EUTECTIC TEMPERATURE.
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***PHASE TRANSITIONS**

DIFFUSION AND PHASE STUDIES OF METALS AND ALLOYS BY INTERNAL FRICTION TECHNIQUES.
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***PHOSPHORUS**

THE VARIATION IN VISCOELASTIC BEHAVIOR WITH TEMPERATURE OF A SERIES OF COPOLYMERS OF PHOSPHOROUS AND SULFUR.
AD-275 392 DIV. 4

***PHOSPHORUS COMPOUNDS**

SYNTHESIS OF INORGANIC CHELATING AGENTS FROM COMPOUNDS CONTAIN O, N, SI, C, S, AND P. AB TYPE LIGANDS CONTAINING METHYL AND PHENYL RADICALS WERE COORDINATED WITH ZN. PHOSPHINE OXIDE INTERMEDIATE WERE PREPARED.
AD-275 618 DIV. 4

***PHOTOCONDUCTIVITY**

FOUNDATIONAL RESEARCH TASK OF NAVAL ORDNANCE LABORATORY; SOLID STATE PHYSICS, LIQUID STATE STUDIES, NUCLEAR PHYSICS ELECTRICITY AND MAGNETISM, GASES AT HIGH PRESSURES AND TEMPERATURES, DETONATION, AND CHEMISTRY OF COMPOUNDS.
AD-275 485 DIV. 25

POLYETHYLENE TEREPHTHALATE CAPACITOR; GAMMA-INDUCED PHOTOCONDUCTIVITY.
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***PHOTOGRAPHY**

DESCRIPTION OF EQUIPMENT, TECHNIQUES, AND RESULTS OF DATA ACQUISITION AND REDUCTION BY STEREOPHOTOGRAMMETRY OF THE TIME VARYING SURFACE OF A WATER-TABLE ANALOGY TO UNSTEADY TWO-DIMENSIONAL COMPRESSIBLE GAS FLOW.
AD-275 584 DIV. 9

***PHOTOMULTIPLIERS**

A STUDY OF RADIATION FROM RE-ENTRY BODIES OF OPTICALLY-ACTIVE GASES, ANALYSIS OF BLUNT BODY FLOW FIELDS AND THE RECOMBINATION REACTIONS OF AIR COUPLED WITH AERODYNAMICS OF THE FLOW.
AD-275 389 DIV. 25

***PHOTOFLASH BULBS**

THE THEORETICAL EFFICIENCY OF VARIOUS PUMPING POWER SYSTEMS THAT WERE ADOPTED IN OPTICAL MASERS IS STUDIED.
AD-275 479 DIV. 25

***PHOTOGRAPHIC FILM**

READING AND WRITING SYSTEMS. A PHOTOMEMORY DEVICE FOR STORAGE AND RAPID RETRIEVAL OF INFORMATION. MILLIONS OF BITS STORED ON A SINGLE DATA PLATE MADE FROM A PHOTOGRAPHIC NEGATIVE. PHOTOMEMORY CAN FUNCTION INDEPENDENT OF COMPUTER.
AD-275 529 DIV. 30

***PHYSICAL PROPERTIES**

CORROSION DATA AND A SUMMARY OF PHYSICAL AND CHEMICAL PROPERTIES OF 1,1,2-TRICHLOROTRIFLUOROETHANE AND 1,2-DIBROMOTETRAFLUOROETHANE WITH EMPHASIS ON THEIR COMPATIBILITY WITH METALS, PLASTICS, AND ELASTOMERS USED IN MISSILE APPLICATIONS.
AD-275 427 DIV. 10

DYNAMIC RESPONSE AND ULTIMATE STRENGTHS OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS.
AD-275 474 DIV. 15

AN INVESTIGATION OF JUNCTION TRANSISTOR BEHAVIOR UNDER SATURATION CONDITIONS.
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***PIEZOELECTRIC CRYSTALS**

A METHODS OF VIRTUAL DISPLACEMENTS FOR ELECTROMECHANICAL SYSTEMS, INCLUDING THOSE WHICH CONTAIN PIEZOELECTRIC CRYSTALS AND MAGNETOSTRICTION ELEMENTS...SONAR SIGNALS...TRANSDUCERS.
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*PLASTIC FLOW

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*PLASTICITY

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THE DYNAMIC BEHAVIOR OF THE RATE SENSITIVE MATERIALS IN THE PLASTIC RANGE: THEIR CONSTITUTIVE EQUATIONS.
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THEORY AND DETERMINATION OF INITIAL AND SUBSQUENT YIELD CURVES FOR 6061-T6 AL TUBULAR SECIMENS. YIELD SURFACES! CORNERS, NORMALITY, BAUSCHINGER AND ALLIED EFFECTS.
AD-275 730 DIV. 17

*PLASTICS

A BIBLIOGRAPHY ON PLASTICS IN THE MEDICAL INDUSTRY, INCLUDING TOXIC EFFECTS, MEDICAL APPLICATIONS SUCH AS IMPLANTS OR REPLACEMENTS, DRAINAGE ACCESSORIES, PROSTHESES, AND GERM-FREE ENCLOSURES OR DRESSINGS. 203 REFERENCES.
AD-275 832 DIV. 14

*POLARIZATION

THE TRANSVERSE POLARIZATION OF INTERNAL CONVERSION ELECTRONS EMITTED FOLLOWING BETA DECAY.
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*POLYMER SOLUTIONS

POLY(N-OCTYL METHACRYLATE) DILUTE SOLUTION PROPERTIES! VISCOSITIES, LIGHT SCATTERING, MOLECULAR WEIGHT.
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HIGH POLYMER SOLUTIONS! OSMOMETRY OF THREE ALKYL METHACRYLATE POLYMERS! VISCOSITY AVERAGE MOLECULAR WEIGHT ESTIMATIONS.
AD-275 807 DIV. 4

*POLYMERIZATION

POLYMERIZATION OF ACRYLAMIDE INITIATED BY 4-4'-AZO-BIS-4-CYANOPENTANOIC ACID, AND POLYMERIZATION RATE REDUCTION IN THE PRESENCE OF FE(CLO4)3 AND HCLO4.
AD-275 531 DIV. 4

*POLYMERS

THE VARIATION IN VISCOELASTIC BEHAVIOR WITH TEMPERATURE OF A SERIES OF COPOLYMERS OF PHOSPHOROUS AND SULFUR.
AD-275 392 DIV. 4

POLYMERIZATION OF ACRYLAMIDE INITIATED BY 4-4'-AZO-BIS-4-CYANOPENTANOIC ACID, AND POLYMERIZATION RATE REDUCTION IN THE PRESENCE OF FE(CLO4)3 AND HCLO4.
AD-275 531 DIV. 4

NON-LINEAR EFFECTS OF TEMPERATURE VARIATION IN STRESS ANALYSIS OF ISOTHERMALLY LINEAR VISCOELASTIC MATERIALS, AS A PARTICULAR EXAMPLE POLYMETHYL-METHACRYLATE IS CONSIDERED.
AD-275 643 DIV. 14

POLY(N-OCTYL METHACRYLATE) DILUTE SOLUTION PROPERTIES! VISCOSITIES, LIGHT SCATTERING, MOLECULAR WEIGHT.
AD-275 710 DIV. 4

HIGH POLYMER SOLUTIONS! OSMOMETRY OF THREE ALKYL METHACRYLATE POLYMERS! VISCOSITY AVERAGE MOLECULAR WEIGHT ESTIMATIONS.
AD-275 807 DIV. 4

AMORPHONS CROSSLINKED POLYMERS, STRESS BIREFRINGENCE COEFFICIENT CALCULATIONS, HIGHLY CRYSTALLINE POLYMER SMALL PHASE ANGLE (BETWEEN STRESS AND STRAIN) DETERMINATIONS! VIBRATION EXPERIMENTS! SYNTHESIS OF STAR-TYPE POLYSTYRENES.
AD-275 820 DIV. 4

*POLYNOMIALS

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AD-275 708 DIV. 15

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AD-275 744 DIV. 15

*POTENTIAL THEORY

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AD-275 769 DIV. 15

*POWER

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*POWER SUPPLIES

THE FEASIBILITY OF VARIOUS AUXILIARY POWER SYSTEMS FOR USE IN AEROSPACE VEHICLES IS REPORTED.
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AD-275 783 DIV. 7

*PRASEODYMIUM

EQUILIBRIUM PHASE DIAGRAMS FOR THE PRASEODYMIUM-NEODYMIUM ALLOY SYSTEM BY METALLOGRAPHIC, THERMAL ANALYTICAL, HARDNESS AND DENSITY DETERMINATIONS.
AD-275 747 DIV. 17

*PRESSURE

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*PRESSURE VESSELS

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AD-275 860 DIV. 14

*PRIMARY BATTERIES

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AD-275 792 DIV. 7

*PROBABILITY

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AD-275 480 DIV. 5

*PROCESSING

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*PROGRAMMING

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THE PROGRAMMING GRAMMAR AND ITS ARRANGEMENT.
AD-275 822 DIV. 30

A DESCRIPTION OF THE BASIC ELEMENTS OF PROGRAMMING LANGUAGE.
AD-275 823 DIV. 30

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*PROJECTILES

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AD-275 882 DIV. 22

*PROPAGATION

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AD-275 398 DIV. 17

RADIO PROPAGATION, COMMUNICATION TECHNIQUES, COMMUNICATION SYSTEMS, SURVEILLANCE TECHNIQUES, ANTENNAS! QUARTERLY PROGRESS REPORT DISCUSSES THE ABOVE TOPICS.
AD-275 470 DIV. 8

A DISCUSSION OF THE THEORY OF ELECTROMAGNETIC WAVE PROPAGATION IN A FLAT EARTH-IONOSPHERE SYSTEM FROM ABOVE SURFACE AND SUBSURFACE ANTENNAS.
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FIRST ORDER RELATIONS BETWEEN AREA CHANGE AND SHOCK STRENGTH FOR CONVERGING CYLINDRICAL AND SPHERICAL HYDROMAGNETIC SHOCKS ARE OBTAINED AND INTEGRATED NUMERICALLY FOR CHANNELS WITH FINITE CONTINUOUS AREA VARIATION.
AD-275 706 DIV. 25

*PROPELLANT GRAINS

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*PROPELLER BLADES

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AD-275 569 DIV. 31

*PROPIONIC ACIDS

METABOLISM OF PROPIONATE AND THE BIOCHEMICAL MECHANISM BY WHICH FATTY ACIDS ARE SYNTHESIZED. CONVERSION OF PROPIONIC ACID BY ADIPOSE TISSUE INTO LIPIDS.
AD-275 868 DIV. 16

*PROPULSION

A TURBOELECTRIC SUBMARINE PROPULSION SYSTEM INCORPORATING TANDEM PROPELLERS WITH BLADES ARRAYED TO PROVIDE DIRECTED THRUST FOR SHIP CONTROL.
AD-275 570 DIV. 31

***PROSTHETICS**

A BIBLIOGRAPHY ON PLASTICS IN THE MEDICAL INDUSTRY, INCLUDING TOXIC EFFECTS. MEDICAL APPLICATIONS SUCH AS IMPLANTS OR REPLACEMENTS, DRAINAGE ACCESSORIES, PROSTHESES, AND GERM-FREE ENCLOSURES OR DRESSINGS. 203 REFERENCES.
AD-275 832 DIV. 16

***PROTECTIVE CLOTHING**

MEASUREMENT OF HEAT STRAIN PRODUCED BY THE E33 HOOD WHEN WORN WITH A CBR PROTECTION ASSEMBLY UNDER HARD WORK CONDITIONS IN HOT, HUMID WEATHER, ADDED STRESS AT 85 F IS ABOUT 2/3 THAT OF SUNSHINE. IN HARDEST WORK, TOLERANCE IS DECREASED BY ABOUT ONE-FOURTH.
AD-275 850 DIV. 29

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AD-275 493 DIV. 28

***PULSE CABLES**

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AD-275 732 DIV. 7

***PULSE COMMUNICATION SYSTEMS**

M-ARY TRANSMISSIONS WITH LINEAR FILTERING ON RALEIGH FADING CIRCUITS, ERROR RATES.
AD-275 436 DIV. 8

A STUDY OF THE PROBLEM OF CONTROLLING INTER-SYMBOL INTERFERENCE AND ADDITIVE NOISE INTERFERENCE IN A CERTAIN TYPE OF PULSE TRANSMISSION SYSTEM.
AD-275 566 DIV. 8

***PULSE MODULATION**

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
AD-275 480 DIV. 5

***PYRIDINES**

MERCAPTOETHYL COMPOUNDS: SYNTHESIS OF HETEROCYCLES INCLUDING PYRIDINES, PYRIMIDINES, PHTHALAZINES, QUINAZOLINE, CINNOLINE, QUINOXALINES, PYRIDAZINE AND BENZIMIDAZOLE AS RADIOPROTECTIVE DRUGS.
AD-275 607 DIV. 4

***PYRIMIDINES**

MERCAPTOETHYL COMPOUNDS: SYNTHESIS OF HETEROCYCLES INCLUDING PYRIDINES, PYRIMIDINES, PHTHALAZINES, QUINAZOLINE, CINNOLINE, QUINOXALINES, PYRIDAZINE AND BENZIMIDAZOLE AS RADIOPROTECTIVE DRUGS.
AD-275 607 DIV. 4

***PYRITES**

A TURBOELECTRIC SUBMARINE PROPULSION SYSTEM INCORPORATING TANDEM PROPELLERS WITH BLADES ARRAYED TO PROVIDE DIRECTED THRUST FOR SHIP CONTROL.
AD-275 570 DIV. 31

***PYROTECHNICS**

ARCTIC WINTER TESTS (0 TO -67 F) OF T72 ILLUMINATING PROJECTILES AND T275 FUZES USING M1 HOWITZERS.
AD-275 882 DIV. 22

***QUALITY CONTROL**

INDUSTRIAL PRODUCTION AND QUALITY CONTROL FOR EXPENSIVE ITEMS.
AD-275 491 DIV. 26

***QUANTUM MECHANICS**

SCATTERING OF PARTICLES BY A POTENTIAL FIELD IS DESCRIBED BY A QUANTUM MECHANICAL APPROACH TO WAVE FUNCTIONS.
AD-275 388 DIV. 25

RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION.
AD-275 473 DIV. 15

FOUNDATIONAL RESEARCH TASK OF NAVAL ORDNANCE LABORATORY SOLID STATE PHYSICS, LIQUID STATE STUDIES, NUCLEAR PHYSICS ELECTRICITY AND MAGNETISM, GASES AT HIGH PRESSURES AND TEMPERATURES, DETONATION, AND CHEMISTRY OF COMPOUNDS.
AD-275 485 DIV. 25

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AD-275 538 DIV. 25

THEORY AND APPLICATION OF QUANTUM GRAVIDYNAMIC EQUATIONS AS ELEMENTARY VERTEX FUNCTIONS OF HIGH ORDER IN ACCORDANCE WITH A GENERALIZED SCHWINGER-FEYNMAN THEORY.
AD-275 778 DIV. 25

***RADAR ANTENNAS**

SIMULTANEOUS SCAN ANTENNAS.
AD-275 755 DIV. 8

***RADAR CONFUSION REFLECTORS**

EFFORT WAS CONTINUED TO DETERMINE THE FEASIBILITY OF USING A CHAFF CLOUD TO COMMUNICATE FROM ONE POINT ON EARTH TO A POINT BELOW THE HORIZON. DATA ARE PRESENTED ON BISTATIC CROSS SECTION OF THE CLOUD, POLARIZATION MEASUREMENTS, AND SPECTRUM FADING FREQUENCIES FOR SIX SAMPLE DROPS.
AD-275 622 DIV. 5

***RADAR EQUIPMENT**

TASK ANALYSIS OF A MOBILE TRAFFIC CONTROL SYSTEM WAS CONDUCTED REGARDING TYPE AND QUANTITY OF INFORMATION FLOW, CAPABILITIES OF CONTROLLERS AND EQUIPMENT.
AD-275 382 DIV. 1

***RADAR INTERFERENCE**

APPLICATION OF OPERATIONS RESEARCH TO PROBLEMS OF RADIO AND RADAR INTERFERENCE IN CONGESTED ELECTROMAGNETIC ENVIRONMENTS.
AD-275 374 DIV. 8

***RADAR SCANNING**

SIMULTANEOUS SCAN ANTENNAS.
AD-275 755 DIV. 8

***RADAR TRANSMITTERS**

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AD-275 726 DIV. 8

***RADIATION COUNTERS**

RADIATION COUNTERS WERE FLOWN ON A SERIES OF BALLOON FLIGHTS TO MONITOR SOLAR FLARE RADIATION AND TO COMPARE THE VARIOUS INSTRUMENT READINGS.
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***RADIATION DAMAGE**

AN INDEX OF REPORT ABSTRACTS OF RADIATION EFFECTS ON VARIOUS MATERIALS AND EQUIPMENTS. INCLUDED ARE METALS, ELECTRONIC EQUIPMENT, CERAMICS, ORGANIC SUBSTANCES, SPACE SHIPS, ETC. COVERS PERIOD 1 APR 62-30 APR 62.
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***RADIATION EFFECTS**

AN INDEX OF REPORT ABSTRACTS OF RADIATION EFFECTS ON VARIOUS MATERIALS AND EQUIPMENTS. INCLUDED ARE METALS, ELECTRONIC EQUIPMENT, CERAMICS, ORGANIC SUBSTANCES, SPACE SHIPS, ETC. COVERS PERIOD 1 APR 62-30 APR 62.
AD-275 528 DIV. 20

***RADIATION HAZARDS**

THE NEAR-FIELD BEHIND A PARABOLIC ANTENNA IS ANALYZED FOR ELECTROMAGNETIC RADIATION HAZARDS. GEOMETRICAL THEORY OF DIFFRACTION IS USED.
AD-275 599 DIV. 8

***RADIATION INJURIES**

OPACITIES IN RABBIT EYES INDUCED BY CONTINUOUS OR PULSED-WAVE RADIATION. ANTERIOR CORTEX OPACITIES AT 8.236, 9.375, AND 10.050 MC; AND POSTERIOR CORTEX OPACITIES AT 2450 MC. DECREASE IN LENS ASCORBIC ACID AND GLUTATHIONE. NON-THERMAL EFFECT DISTINGUISHED FROM USUAL THERMAL EFFECT.
AD-275 840 DIV. 14

***RADIO ASTRONOMY**

RADIO PROPAGATION, COMMUNICATION TECHNIQUES, COMMUNICATION SYSTEMS, SURVEILLANCE TECHNIQUES, ANTENNAS; QUARTERLY PROGRESS REPORT DISCUSSES THE ABOVE TOPICS.
AD-275 470 DIV. 8

***RADIO COMMUNICATION SYSTEMS**

APPLICATION OF OPERATIONS RESEARCH TO PROBLEMS OF RADIO AND RADAR INTERFERENCE IN CONGESTED ELECTROMAGNETIC ENVIRONMENTS.
AD-275 374 DIV. 8

RADIO PROPAGATION, COMMUNICATION TECHNIQUES, COMMUNICATION SYSTEMS, SURVEILLANCE TECHNIQUES, ANTENNAS; QUARTERLY PROGRESS REPORT DISCUSSES THE ABOVE TOPICS.
AD-275 470 DIV. 8

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
AD-275 480 DIV. 5

EFFORT WAS CONTINUED TO DETERMINE THE FEASIBILITY OF USING A CHAFF CLOUD TO COMMUNICATE FROM ONE POINT ON EARTH TO A POINT BELOW THE HORIZON. DATA ARE PRESENTED ON BISTATIC CROSS SECTIONS OF THE CLOUD, POLARIZATION MEASUREMENTS, AND SPECTRUM FADING FREQUENCIES FOR SIX SAMPLE DROPS.
AD-275 622 DIV. 5

***RADIO INTERFERENCE**

APPLICATION OF OPERATIONS RESEARCH TO PROBLEMS OF RADIO AND RADAR INTERFERENCE IN CONGESTED ELECTROMAGNETIC ENVIRONMENTS.
AD-275 374 DIV. 8

A STUDY OF THE PROBLEM OF CONTROLLING INTER-SYMBOL INTERFERENCE AND ADDITIVE NOISE INTERFERENCE IN A CERTAIN TYPE OF PULSE TRANSMISSION SYSTEM.
AD-275 566 DIV. 8

***RADIO INTERFEROMETERS**

A PHASE-CHANNEL COMBINER WHICH AUTOMATICALLY COMBINES THE PHASE CHANNELS INTO ONE UNAMBIGUOUS CHANNEL AND DEPICTS THE ANGLES OF ARRIVAL OF THE RADIO ENERGY FROM RADIO INTERFEROMETER TRACKED SATELLITES) DEVELOPED FOR THE NRL FENCE SPACE SURVEILLANCE SYSTEM.
AD-275 486 DIV. 6

***RADIO RECEIVERS**

A PHASE-CHANNEL COMBINER WHICH AUTOMATICALLY COMBINES THE PHASE CHANNELS INTO ONE UNAMBIGUOUS CHANNEL AND DEPICTS THE ANGLES OF ARRIVAL OF THE RADIO ENERGY FROM RADIO INTERFEROMETER TRACKED SATELLITES) DEVELOPED FOR THE NRL FENCE SPACE SURVEILLANCE SYSTEM.
AD-275 486 DIV. 6

***RADIO RELAY SYSTEMS**

EFFORT WAS CONTINUED TO DETERMINE THE FEASIBILITY OF USING A CHAFF CLOUD TO COMMUNICATE FROM ONE POINT ON EARTH TO A POINT BELOW THE HORIZON. DATA ARE PRESENTED ON BISTATIC CROSS SECTIONS OF THE CLOUD, POLARIZATION MEASUREMENTS, AND SPECTRUM FADING FREQUENCIES FOR SIX SAMPLE DROPS.
AD-275 622 DIV. 5

***RADIO TRANSMISSION**

COMPONENTS AND TECHNIQUES FOR THE GENERATION, TRANSMISSION, AND DETECTION OF ENERGY IN THE 100 TO 300 GC FREQUENCY REGION WERE INVESTIGATED.
AD-275 576 DIV. 8

EFFORT WAS CONTINUED TO DETERMINE THE FEASIBILITY OF USING A CHAFF CLOUD TO COMMUNICATE FROM ONE POINT ON EARTH TO A POINT BELOW THE HORIZON. DATA ARE PRESENTED ON BISTATIC CROSS SECTIONS OF THE CLOUD, POLARIZATION MEASUREMENTS, AND SPECTRUM FADING FREQUENCIES FOR SIX SAMPLE DROPS.
AD-275 622 DIV. 5

***RADIO TRANSMITTERS**

EXPERIMENTAL RESULTS OBTAINED BY MEASURING SPURIOUS EMISSION POWER OF MICROWAVES BY THE FIXED PROBE METHOD (WHICH MEASURES BY PROBES LOCATED ON THE WAVEGUIDE BOUNDARY) AND THE MOVABLE PROBE METHOD (WHICH MEASURES BY MOVABLE PROBES THAT SCAN A PLANE TRANSVERSE TO THE DIRECTION OF PROPAGATION).
AD-275 726 DIV. 8

***RADIO WAVES**

RADIO PROPAGATION, COMMUNICATION TECHNIQUES, COMMUNICATION SYSTEMS, SURVEILLANCE TECHNIQUES, ANTENNAS; QUARTERLY PROGRESS REPORT DISCUSSES THE ABOVE TOPICS.
AD-275 470 DIV. 8

RANDOM PROCESSES FOR SPECTRAL ANALYSIS OF FREQUENCY MODULATED WAVES WHERE THERE IS A VARIATION BY BAND-PASS NOISE POWER DENSITY SPECTRA AS A FUNCTION OF THE MODULATION PARAMETERS.
AD-275 761 DIV. 25

*RADIOACTIVE DECAY

THE TRANSVERSE POLARIZATION OF INTERNAL CONVERSION ELECTRONS EMITTED FOLLOWING BETA DECAY.
AD-275 454 DIV. 20

*RADIOACTIVE ISOTOPES

NEUTRON PARTIAL CROSS SECTIONS (N,2N) ARE MEASURED FOR ZN-64; BR-79; AG-107; SB-121; PR-141; AND NB-93.
AD-275 551 DIV. 20

SHIELDING EXPERIMENTS WERE CARRIED OUT WITH AN 11 X 11-INCH DUCT IN CONCRETE WITH ONE RIGHT-ANGLE BEND AND WITH CO-60 AS A GAMMA-RAY SOURCE.
AD-275 600 DIV. 20

*RADIOCHEMISTRY

BRIEF SURVEY OF RESEARCH IN SOLID STATE PHYSICS, RADIOCHEMISTRY, PHYSICAL ELECTRONICS, AND ADVANCED THEORY BRANCHES OF MATERIALS USED IN ELECTRONIC EQUIPMENT AND ELECTRON TUBES.
AD-275 401 DIV. 14

*RADIOFREQUENCY

FEASIBILITY OF USING THE SUPERCONDUCTIVE PROPERTIES OF CERTAIN METALLIC THIN FILM CONFIGURATIONS TO PERFORM ELECTRONIC FUNCTIONS SUCH AS RADIOFREQUENCY DETECTION. METALLIC CRYSTALS AS SUPERCONDUCTORS.
AD-275 472 DIV. 25

*RADIOFREQUENCY CABLES

PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH POWER TRANSMISSION LINES IN A TRENCH COVERED BY COAL, COKE AND EARTH.
AD-275 390 DIV. 25

THE OPTIMUM DESIGN OF HIGH POWER PULSE CABLE CONNECTOR ASSEMBLIES FOR RG-191/U AND RG-192/U CABLES.
AD-275 732 DIV. 7

*RADIOFREQUENCY GENERATORS

THE EFFECTIVE UTILIZATION OF NON-PRECISE TUNING COMPONENTS RESULTS IN A FREQUENCY SYNTHESIS TECHNIQUE WHICH PERMITS THE RAPID SELECTION OF FREQUENCIES; IS ADAPTABLE TO REMOTE CONTROL; IS READILY PROGRAMMED; AND THEORETICALLY; IS UNLIMITED IN FREQUENCY RANGE OF OPERATION.
AD-275 597 DIV. 8

*RADIOFREQUENCY POWER

EXPERIMENTAL RESULTS OBTAINED BY MEASURING SPURIOUS EMISSION POWER OF MICROWAVES BY THE FIXED PROBE METHOD (WHICH MEASURES BY PROBES LOCATED ON THE WAVEGUIDE BOUNDARY) AND THE MOVABLE PROBE METHOD (WHICH MEASURES BY MOVABLE PROBES THAT SCAN A PLANE TRANSVERSE TO THE DIRECTION OF PROPAGATION).
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*RADIOFREQUENCY PULSES

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*ROCKET MOTORS

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A SIMULATED OPERATIONS RESEARCH MODEL OF A COMPLEX SYSTEM WITHOUT REWARD TO THE MECHANICAL ASPECTS.
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AN ANNOTATED BIBLIOGRAPHY OF EPITAXIAL GROWTH PROCESSES, INCLUDING CRYSTAL GROWTH AND FORMATION, VAPOR GROWTH, THINNING AND THIN FILM PROCESSES. COVERS PERIOD 1960 - FEBRUARY 1962. 78 REFERENCES.
AD-275 588 DIV. 25

PREPARATION OF HIGH PURITY BE SINGLE CRYSTALS AND FOILS AND A STUDY OF THEIR DEFORMATION AND FRACTURE CHARACTERISTICS. ZONE MELTING, AND COMPRESSION TENSION AND ELECTRICAL RESISTIVITY MEASUREMENTS.
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*SOCIOLOGY

AN ANNOTATED BIBLIOGRAPHY OF BASIC PSYCHOLOGY OF GROUP BEHAVIOR. CONTAINS GENERAL STUDIES, ROLES AND STATUS AND INTRAGROUP INTERACTIONS, COMMUNICATION AND INFORMATION, INDIVIDUAL PERCEPTION IN GROUP BEHAVIOR, ATTITUDES AND ATTITUDE CHANGE, AND METHODOLOGICAL STUDIES.
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*SOLAR FLARES

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*SOLENOIDS

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*SOLID DELAY LINES

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*SOLID ROCKET PROPELLANTS

TENSILE PROPERTIES OF DOUBLE-BASE PROPELLANT; EFFECT OF RATE LOADING AND TEMPERATURE; PRONOUNCED PEAKS AND VALLEYS SHOWN WITH RESPECT TO THE ENERGY ABSORPTION AND ULTIMATE ELONGATION AND PRONOUNCED DISCONTINUITIES WITH RESPECT TO THE MODULUS.
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DETONATION STUDIES ON PROPELLANTS AND HIGH EXPLOSIVES. INITIATION MECHANISMS AND THE ROLE OF CAVITATION ON THE PROPAGATION OF DETONATION IS EMPHASIZED. INITIATION OF DETONATION RESULTING FROM COMBUSTION INSTABILITIES.
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*SOLID STATE PHYSICS

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MODIFICATION OF A 30-FOOT BEAM APPARATUS FOR MEASURING LIFETIME METOSTABLE STATE OF HELIUM IS DESCRIBED, AND A DESCRIPTION IS GIVEN OF MOLECULAR PHYSICS PROJECTS INCLUDING OPTICAL MASERS, MOLECULAR BEAMS, MICROWAVE AND MASS SPECTROSCOPY AND RADIOASTRONOMICAL MEASUREMENTS.
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AD-275 488 DIV. 25

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AD-275 897 DIV. 8

A PRACTICAL COMMUTATING SYSTEM IS DESCRIBED WHICH IS CAPABLE OF SWITCHING 2 SETS OF 500 OR MORE GRID CONDUCTORS IN TIME RELATIONSHIP AT TV SCANNING RATES UNDER A CAPACITIVE LOAD WITH TV AM CAPABILITIES. SOLID DELAY LINES FOR TV DISPLAY SYSTEMS.
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*SOLIDIFIED GASES

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*SOLIDS

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*SOLUBILITY

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AD-275 596 DIV. 25

*SOLUTIONS

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*SONAR SIGNALS

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*SOUND RANGING

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*SPACESHIPS

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***SPEECH TRANSMISSION**

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
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A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED, AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS, VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
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A CURRENT LISTING OF SELECTED ABSTRACTS OF DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
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TREATMENT OF STEEL, STAINLESS STEEL AND INCONEL; ALUMINIZING TESTS OF TI ALLOY AND UDIMET; MECHANICAL PROPERTIES OF WELDED JOINTS OF TI ALLOY FOILS.
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***STRESSES**

RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO, AM355, AND 4340 STEELS; B120 VCA TI ALLOY; RENE 41 NI-BASE ALLOY; AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
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***SUBMARINES**

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***SULFUR COMPOUNDS**

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***SUPERCONDUCTIVITY**

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***SUPERCONDUCTORS**

FEASIBILITY OF USING THE SUPERCONDUCTIVE PROPERTIES OF CERTAIN METALLIC THIN FILM CONFIGURATIONS TO PERFORM ELECTRONIC FUNCTIONS SUCH AS RADIOFREQUENCY DETECTION. METALLIC CRYSTALS AS SUPERCONDUCTORS.
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A PRACTICAL COMMUTATING SYSTEM IS DESCRIBED WHICH IS CAPABLE OF SWITCHING 2 SETS OF 500 OR MORE GRID CONDUCTORS IN TIME RELATIONSHIP AT TV SCANNING RATES UNDER A CAPACITIVE LOAD WITH TV AM CAPABILITIES. SOLID DELAY LINES FOR TV DISPLAY SYSTEMS.
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***SYMPOSIA**

INFORMATION ON DIMRAB, (DUREPS-INDUSTRY MATERIAL RELIABILITY ADVISORY BOARD) IS PROVIDED. STUDIES ON SAFETY, RELIABILITY, AVAILABILITY, SUITABILITY OF NAVAL WEAPONS SYSTEMS MATERIALS. RECOMMENDATION OF PERTINENT DESIGN REQUIREMENTS. SYMPOSIUM ON MATERIALS FOR NAVAL AIRCRAFT AND MISSILES.
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*TANTALUM

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*TANTALUM ALLOYS

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*TARGET RECOGNITION

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*TAYLOR'S SERIES

RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION.
AD-275 473 DIV. 15

*TELEVISION CAMERAS

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*TELEVISION DISPLAY SYSTEMS

A PRACTICAL COMMUTATING SYSTEM IS DESCRIBED WHICH IS CAPABLE OF SWITCHING 2 SETS OF 500 OR MORE GRID CONDUCTORS IN TIME RELATIONSHIP AT TV SCANNING RATES UNDER A CAPACITIVE LOAD WITH TV AM CAPABILITIES. SOLID DELAY LINES FOR TV DISPLAY SYSTEMS.
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*TEMPERATURE

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*TENSILE PROPERTIES

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AD-275 399 DIV. 26

TENSILE PROPERTIES OF DOUBLE-BASE PROPELLANT: EFFECT OF RATE LOADING AND TEMPERATURE: PRONOUNCED PEAKS AND VALLEYS SHOWN WITH RESPECT TO THE ENERGY ABSORPTION AND ULTIMATE ELONGATION AND PRONOUNCED DISCONTINUITIES WITH RESPECT TO THE MODULUS.
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*TENSOR ANALYSIS

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AD-275 473 DIV. 15

*TERMINAL BALLISTICS

THE ARNOLD ENGINEERING DEVELOPMENT CENTER BALLISTICS RANGES AND AVAILABLE INSTRUMENTATION SYSTEMS ARE DESCRIBED. CURRENT LAUNCHER PERFORMANCE, INSTRUMENTATION AND DATA REDUCTION TECHNIQUES ARE PRESENTED.
AD-275 362 DIV. 30

*TEST EQUIPMENT

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*TE.. FACILITIES

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*TEST METHODS

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DYNAMIC RESPONSE AND ULTIMATE STRENGTHS OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS.
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*TESTS

PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH POWER TRANSMISSION LINES IN A TRENCH COVERED BY COAL, COKE AND EARTH.
AD-275 390 DIV. 25

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED, AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS, VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
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AD-275 472 DIV. 25

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*TETROXIDES

TITAN II PROPELLANT PHYSICAL PROPERTIES, MATERIALS COMPATABILITY, HANDLING TECHNIQUES, FLAMABILITY AND EXPLOSIVITY HAZARDS, STORAGE, CLEANING AND FLUSHING OF PROPELLANT TANKS.
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*THAILAND

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*THEORY

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AD-275 352 DIV. 15

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED, AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS, VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

A STATE-OF-THE-ART STUDY OF THEORY AND PRACTICE OF COORDINATE INDEXING WHICH COVERS NEARLY EVERY MECHANIZED SYSTEM. AN ANNOTATED BIBLIOGRAPHY OF SIGNIFICANT PAPERS PUBLISHED BETWEEN 1947 AND 1960.
AD-275 393 DIV. 32

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AD-275 404 DIV. 7

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AD-275 467 DIV. 8

DYNAMIC RESPONSE AND ULTIMATE STRENGTHS OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS.
AD-275 474 DIV. 15

AN EXPERIMENTAL METHOD FOR CALCULATING ELEMENTARY PARTICLE CONSTANTS IS DESCRIBED.
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*THERMAL CONDUCTIVITY

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*THERMAL RADIATION

VELOCITY AND THERMAL BEHAVIOR OF PARTICLES EJECTED FROM SMALL ROCKET ATTACHED TO HYPERVELOCITY VEHICLE. ANALYSIS OF PARTICLE CONTINUUM RADIATION. STUDY OF SMALL CESIUM-NITRATE ALUMINUM SOLID PROPELLANT ROCKET ATTACHED TO ICBM REENTRY VEHICLE. RADIATIVE PROPERTIES OF EXHAUST PRODUCTS OF ROCKET SYSTEM.
AD-275 413 DIV. 25

INVESTIGATION OF FUNDAMENTAL PROCESSES OF ENERGY CONVERSION.
AD-275 610 DIV. 25

STANDARDIZATION SELECTION AND DESIGN OF EQUIPMENT FOR MEASUREMENT OF SPECTRAL BEHAVIOR OF MATERIALS USED IN DATA-PROCESSING EQUIPMENT.
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*THERMAL TARGETS

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*THERMIONIC EMISSION

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AD-275 516 DIV. 7

PHYSICAL AND ELECTRICAL PROPERTIES OF ZR CARBIDE AND W CRYSTALS. THERMIONIC, THERMAL EXPANSION AND THERMAL STABILITY MEASUREMENTS. PREPARATION AND PURIFICATION EFFECTS. TEST DIODE DESIGN.
AD-275 371 DIV. 14

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HONOCAPILLARY THERMIONIC EMITTER AS A DUAL SOURCE OF IONS AND ELECTRONS.
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*THERMOCHEMISTRY

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AD-275 452 DIV. 4

*THERMOCOUPLES

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*THERMODYNAMICS

A STUDY OF RADIATION FROM RE-ENTRY BODIES OF OPTICALLY-ACTIVE GASES: ANALYSIS OF BLUNT BODY FLOW FIELDS AND THE RECOMBINATION REACTIONS OF AIR COUPLED WITH AERODYNAMICS OF THE FLOW.
AD-275 389 DIV. 25

THE EFFECTS OF THE CURRENT CARRYING CAPACITY OF SUPERCONDUCTORS UPON THE DIRECTION OF EXTERNALLY PRODUCED MAGNETIC FIELDS.
AD-275 396 DIV. 25

GASES IDEAL GAS THERMODYNAMIC FUNCTIONS FOR 1, 2, 3, AND 4 GASEOUS IONS UP TO 51,000 K.
AD-275 542 DIV. 25

AN ANALYSIS OF THE THERMODYNAMIC FUNCTIONS OF DISSOCIATING AIR IS GIVEN BASED UPON AN APPROXIMATELY GIVEN STATISTICAL SUM OF GAS MOLECULES.
AD-275 816 DIV. 25

*THERMOELECTRICITY

BRIEF SURVEY OF RESEARCH IN SOLID STATE PHYSICS, RADIOCHEMISTRY, PHYSICAL ELECTRONICS, AND ADVANCED THEORY BRANCHES OF MATERIALS USED IN ELECTRONIC EQUIPMENT AND ELECTRON TUBES.
AD-275 401 DIV. 14

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*THIN FILMS

STEEL PANELS COATED WITH ULTRA-THIN FILMS OF ALOX 2028 (MIXTURE OF ORGANIC ACIDS AND ESTERS) SHOWED THE BEST CORROSION PREVENTION PROPERTIES. CORROSION AND HUMIDITY CABINET EQUIPMENT.
AD-275 360 DIV. 17

BRIEF SURVEY OF RESEARCH IN SOLID STATE PHYSICS, RADIOCHEMISTRY, PHYSICAL ELECTRONICS, AND ADVANCED THEORY BRANCHES OF MATERIALS USED IN ELECTRONIC EQUIPMENT AND ELECTRON TUBES.
AD-275 401 DIV. 14

FEASIBILITY OF USING THE SUPERCONDUCTIVE PROPERTIES OF CERTAIN METALLIC THIN FILM CONFIGURATIONS TO PERFORM ELECTRONIC FUNCTIONS SUCH AS RADIOFREQUENCY DETECTION. METALLIC CRYSTALS AS SUPERCONDUCTORS.
AD-275 472 DIV. 25

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AD-275 485 DIV. 25

EPITAXIAL GROWTH OF SI CHEMICAL AND THERMODYNAMIC ASPECTS OF VAPOR PLATING.
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*THIOLS

MERCAPTOETHYL COMPOUNDS: SYNTHESIS OF HETEROCYCLES INCLUDING PYRIDINES, PYRIMIDINES, PHTHALAZINES, QUINAZOLINE, CINNOLINE, QUINOXALINES, PYRIDAZINE AND BENZIMIDAZOLE AS RADIOPROTECTIVE DRUGS.
AD-275 607 DIV. 4

*THRUST

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AD-275 463 DIV. 12

PROPULSION REQUIREMENTS FOR A ROCKET POWERED HOVERING VEHICLE.
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ACCELERATION OF A GAS PLASMA IN AN ANNULAR DC ARC CONFIGURATION COUPLED WITH A MAGNETIC FIELD IN THE DIRECTION OF PLASMA FLOW.
AD-275 739 DIV. 25

*THYROID GLAND

STUDIES OF THE RELATIONSHIPS BETWEEN METABOLIC RATE OF FOOD INTAKE, EXERCISE AND THE FUNCTION OF THE THYROID GLAND DURING COLD EXPOSURE OF 5 DEGREES C. THYROID HORMONE SECRETION AND ITS RELATIONSHIP TO BASAL METABOLISM AND PATHOGENESIS WERE STUDIED.
AD-275 862 DIV. 16

*THYROID HORMONES

STUDIES OF THE RELATIONSHIPS BETWEEN METABOLIC RATE OF FOOD INTAKE, EXERCISE AND THE FUNCTION OF THE THYROID GLAND DURING COLD EXPOSURE OF 5 DEGREES C. THYROID HORMONE SECRETION AND ITS RELATIONSHIP TO BASAL METABOLISM AND PATHOGENESIS WERE STUDIED.
AD-275 862 DIV. 16

*TIN COMPOUNDS

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AD-275 485 DIV. 25

*TITANIUM

A CURRENT LISTING OF SELECTED ABSTRACTS OF DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
AD-275 396 DIV. 17

*TITANIUM ALLOYS

DESIGN CONTINUED ON A 40 IN. ROCKET MOTOR CASE FOR SOLID ROCKET PROPELLANTS. FABRICATION OF A 20 IN. TEST CASE FROM TI-13V-11CR-3AL ALLOYS, AND 20% NI-STEEL WAS DISCUSSED.
AD-275 377 DIV. 27

RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO, AM355, AND 4340 STEELS; B120 VCA TI ALLOY; RENE 41 NI-BASE ALLOY; AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
AD-275 395 DIV. 17

MECHANICAL PROPERTY DATA FOR AL AND TI ALLOYS AT CRYOGENIC TEMPERATURES.
AD-275 483 DIV. 17

DATA CONCERNING AGING, STRAIN AGING AND HEAT TREATMENT OF STEEL; STAINLESS STEEL AND INCONEL; ALUMINIZING TESTS OF TI ALLOY AND UDIMET; MECHANICAL PROPERTIES OF WELDED JOINTS OF TI ALLOY FOILS.
AD-275 839 DIV. 17

*TOPOLOGY

CONCEPTS OF EXTREMAL FUNCTIONS DEFINED ON CERTAIN CLASSES OF DOMAINS.
AD-275 351 DIV. 15

RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION.
AD-275 473 DIV. 15

THEORY AND APPLICATION OF QUANTUM GRAVIDYNAMIC EQUATIONS AS ELEMENTARY VERTEX FUNCTIONS OF HIGH ORDER IN ACCORDANCE WITH A GENERALIZED SCHWINGER-FEYNMAN THEORY
AD-275 778 DIV. 25

*TOXIC AGENT ALARMS

ANALYSIS OF LOPAIR SYSTEMS FOR DETECTION OF CW AGENTS. TESTS THROUGH AIRCRAFT EXHAUST TRAILS AND ATMOSPHERIC SCINTILLATION AT A RANGE OF 10,825 FEET. CHOPPED AND STEADY INFRARED SOURCES.
AD-275 380 DIV. 6

*TRACKED VEHICLES

MODEL TESTS OF TRACKED VEHICLES AND SOILS. MATHEMATICAL PREDICTIONS ARE MADE ON THE DRAWBAR PULL OF TRACK LAYING VEHICLES.
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*TRACKING

A PHASE-CHANNEL COMBINER WHICH AUTOMATICALLY COMBINES THE PHASE CHANNELS INTO ONE UNAMBIGUOUS CHANNEL AND DEPICTS THE ANGLES OF ARRIVAL OF THE RADIO ENERGY FROM RADIO INTERFEROMETER TRACKED SATELLITES; DEVELOPED FOR THE NRL FENCE SPACE SURVEILLANCE SYSTEM.
AD-275 486 DIV. 6

PERFORMANCE OF THE HUMAN OPERATOR IN TRACKING TASKS WITHOUT VISUAL FEEDBACK. CONSERVATION OF TRACKING INFORMATION IN A SYSTEM WITHOUT DYNAMICS. REPRESENTATION OF A HUMAN OPERATOR ON AN OPEN-LOOP TASK BY A LINEAR TIME-VARYING MODEL.
AD-275 776 DIV. 6

*TRAINING

AN INDOCTRINATION COURSE DESIGNED FOR AIR FORCE PERSONNEL ASSIGNED TO ARCTIC REGIONS. BRIEFINGS ON GROUND SAFETY, FIRE PREVENTION, PERSONAL HEALTH, EXPOSURE AND WILD LIFE AS CONDITIONING TO SITE ASSIGNMENT
AD-275 863 DIV. 23

*TRANSDUCERS

A METHODS OF VIRTUAL DISPLACEMENTS FOR ELECTROMECHANICAL SYSTEMS, INCLUDING THOSE WHICH CONTAIN PIEZOELECTRIC CRYSTALS AND MAGNETOSTRICTION ELEMENTS...SONAR SIGNALS...TRANSDUCERS.
AD-275 484 DIV. 25

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AD-275 485 DIV. 25

*TRANSFORMATIONS

AN APPLICATION OF INTEGRAL GEOMETRY TO PATTERN RECOGNITION.
AD-275 352 DIV. 15

*TRANSFORMATIONS (MATHEMATICS)

RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION.
AD-275 473 DIV. 15

*TRANSISTORS

AN INVESTIGATION OF JUNCTION TRANSISTOR BEHAVIOR UNDER SATURATION CONDITIONS.
AD-275 585 DIV. 8

*TRANSITION TEMPERATURE

TUNGSTEN SHEET ROLLING PROGRAM. EFFECTS OF ROLLING AND ANNEALING ON MICROSTRUCTURE, TENSILE PROPERTIES, AND BEND TRANSITION TEMPERATURES.
AD-275 399 DIV. 26

*TRANSMISSION LINES

THE DESIGN OF A TRANSMISSION LINE WHICH IS TO PASS AUDIO FREQUENCY FIRING SIGNALS TO AN ELECTRIC INITIATOR WHILE ATTENUATING HIGH-FREQUENCY ENERGY IS DISCUSSED.
AD-275 363 DIV. 7

THE FEASIBILITY OF VARIOUS AUXILIARY POWER SYSTEMS FOR USE IN AEROSPACE VEHICLES IS REPORTED.
AD-275 371 DIV. 7

PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH POWER TRANSMISSION LINES IN A TRENCH COVERED BY COAL, COKE AND EARTH.
AD-275 390 DIV. 25

ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF THE FEASIBILITY OF POWER TRANSMISSION BY MEANS OF ACOUSTIC OR VIBRATORY MECHANICAL ENERGY IS PRESENTED.
AD-275 546 DIV. 7

COMPONENTS AND TECHNIQUES FOR THE GENERATION, TRANSMISSION, AND DETECTION OF ENERGY IN THE 100 TO 300 GC FREQUENCY REGION WERE INVESTIGATED.
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*TRANSMITTER RECEIVERS

APPLICATION OF OPERATIONS RESEARCH TO PROBLEMS OF RADIO AND RADAR INTERFERENCE IN CONGESTED ELECTROMAGNETIC ENVIRONMENTS.
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*TRANSONIC WIND TUNNELS

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***TRANSONICS**

MEASUREMENT OF THE PRESSURE FLUCTUATIONS IN THE TEST SECTION OF A 1-FOOT TRANSONIC WIND TUNNEL IN THE FREQUENCY RANGE FROM 5 TO 1250 CPS.
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***TRANSPORT PLANES**

STATUS OF V/STOL TECHNOLOGY. TILT-WING VTOL LOGISTIC TRANSPORTS FOR NAVY SUPPORT MISSIONS.
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***TRAVELING WAVE TUBES**

HIGH-POWER 100-300 MC CRESTATRONS EXPERIMENTAL DATA AND DESIGN.
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THE TURBULENT WIND FIELD IN THE LEE OF MOUNTAIN RIDGES AND TREE LINES AS STUDIED BY TRACKING BALLOONS WITH THEODOLITES.
AD-275 611 DIV. 2

***TUNGSTEN**

ZONE REFINING OF CEMENTED W-NI-FE ALLOYS TO PRODUCE SHEET W. FEASIBILITY STUDIES OF EXPLORING THE COLD DUCTILITY OF 2-PHASE ALLOYS AND SUBSEQUENTLY REMOVING THE LOW-MELTING MATRIX.
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A CURRENT LISTING OF SELECTED ABSTRACTS OF DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
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EXPLOSIVE FORMING OF W AND MO-0.5 TI ALLOY: THEIR OPTIMUM STRAIN RATES AND TRANSFER MEDIA.
AD-275 513 DIV. 17

PHYSICAL AND ELECTRICAL PROPERTIES OF ZR CARBIDE AND B CRYSTALS. THERMIONIC, THERMAL EXPANSION AND THERMAL STABILITY MEASUREMENTS. PREPARATION AND PURIFICATION EFFECTS. TEST DIODE DESIGN.
AD-275 571 DIV. 14

TUNGSTEN SHEET FABRICATION FEASIBILITY OF UTILIZING THE POINT DEFORMATION OF FLOW-TURN PRINCIPLE: SUCCESSFUL FLOW TURNING OF CONES AND CYLINDERS.
AD-275 742 DIV. 26

***TUNGSTEN ALLOYS**

DEVELOPMENT OF LIQUID-PHASE SINTERED W-BASE ALLOYS WITH IMPROVED ROOM TEMPERATURE DUCTILITY AND MATRIX MELTING TEMPERATURES IN EXCESS OF 2500 C.
AD-275 368 DIV. 17

ZONE REFINING OF CEMENTED W-NI-FE ALLOYS TO PRODUCE SHEET W. FEASIBILITY STUDIES OF EXPLORING THE COLD DUCTILITY OF 2-PHASE ALLOYS AND SUBSEQUENTLY REMOVING THE LOW-MELTING MATRIX.
AD-275 369 DIV. 17

W-C EQUILIBRIUM SYSTEM SOLID-SOLUBILITY LIMIT WAS RESOLVED AND IS PRESENTED: C SOLUBILITY ATTAINS A MAXIMUM OF 0.3 AT. % C AT THE EUTECTIC TEMPERATURE.
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***TUNGSTEN COMPOUNDS**

METALORGANIC COMPOUNDS OF MO AND W COMPLEX COMPOUNDS WITH EITHER AN M-C OR M-P BOND: AMINES, PYRIDINES.
AD-275 808 DIV. 4

***TUNING CIRCUITS**

THE EFFECTIVE UTILIZATION OF NON-PRECISE TUNING COMPONENTS RESULTS IN A FREQUENCY SYNTHESIS TECHNIQUE WHICH PERMITS THE RAPID SELECTION OF FREQUENCIES, IS ADAPTABLE TO REMOTE CONTROL, IS READILY PROGRAMMED, AND THEORETICALLY, IS UNLIMITED IN FREQUENCY RANGE OF OPERATION.
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***TUNING DEVICES**

THE EFFECTIVE UTILIZATION OF NON-PRECISE TUNING COMPONENTS RESULTS IN A FREQUENCY SYNTHESIS TECHNIQUE WHICH PERMITS THE RAPID SELECTION OF FREQUENCIES, IS ADAPTABLE TO REMOTE CONTROL, IS READILY PROGRAMMED, AND THEORETICALLY, IS UNLIMITED IN FREQUENCY RANGE OF OPERATION.
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***TURBOJET ENGINES**

RESULTS OF WIND TUNNEL TESTS OF A FULL SCALE FUSELAGE MOUNTED YIP TURBINE DRIVEN LIFT FAN INCLUDE: BASIC AIRPLANE PERFORMANCE (FAN OFF), FAN POWERED AIRCRAFT PERFORMANCE, AND FAN AERODYNAMIC PERFORMANCE.
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***TURBULENCE**

ANALYSIS OF ATMOSPHERIC TURBULENCE FROM MISSILE FLIGHT WIND MEASUREMENT.
AD-275 652 DIV. 2

***TURBULENT BOUNDARY LAYER**

SOME REMARKS ON INTEGRAL MOMENT METHODS FOR LAMINAR BOUNDARY LAYERS WITH APPLICATION TO SEPARATION AND REATTACHMENT.
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***UNDERGROUND EXPLOSIONS**

A BIBLIOGRAPHY OF 190 ABSTRACTED PUBLICATIONS ON SEISMOLOGY AND DETECTION OF UNDERGROUND EXPLOSIONS. PROGRAM COVERS SEISMIC SOURCE MECHANISMS; WAVE PROPAGATION; PROPAGATION PATHS; SIGNAL DETECTION; DATA; GENERAL STUDIES; AND ELECTROMAGNETIC SIGNALS FROM UNDERGROUND DISTURBANCES.
AD-275 594 DIV. 2

***USSR**

FEASIBILITY OF RUSSIA'S ACHIEVING ITS 7-YEAR PLAN AGRICULTURAL GOALS FOR 11 BASIC COMMODITIES. AGGREATE OUTPUT OF POSSIBLY 24% COMPARED WITH PLANNED INCREASE OF 62%.
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ELECTROHYDRODYNAMIC POWER GENERATION BY AN ELECTROSTATIC DEVICE OPERATING ON THE PRINCIPLE OF A VAN DE GRAAFF GENERATOR WITH GAS IONIZED BY A CORONA DISCHARGE.
AD-275 404 DIV. 7

***VANADIUM ALLOYS**

PACK-CEMENTED SILICONIZED AND FLAME-SPRAYED NI COATINGS FOR PROTECTING V-NB BASE ALLOYS IN AIR AT 2000 F AND ABOVE. SELF-HEALING OF DEFECTS. OXIDATION TEST RESULTS ON DEFORMED SPECIMENS.
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RESIDUAL STRENGTH AND CRACK PROPAGATION CHARACTERISTICS ON PH15-7 MO; AM355; AND 4340 STEELS; B120 VCA TI ALLOY; RENE 41 NI-BASE ALLOY; AND COATED MO AT TEMPERATURES FROM -340 TO 2500 F.
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MECHANICAL PROPERTY DATA FOR AL AND TI ALLOYS AT CRYOGENIC TEMPERATURES.
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PREPARATION OF OXOVANADIUM COMPLEXES OF PERCHLORATES AND OXYCHLORIDES COMBINED WITH PYRIDINES, PHENYL PHOSPHINE, PHENYL ARSENIDES AND METHYL SULPHIDES. MOLECULAR STRUCTURE DETERMINATION BY IR SPECTROSCOPY; MAGNETIC MOMENTS AND CONDUCTANCE MEASUREMENTS.
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***VAPOR PLATING**

VAPOR PHASE DEPOSITION OF SINGLE CRYSTAL SI OVERGROWTHS ON SI SUBSTRATES.
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A TANDEM PROPELLER SYSTEM TO PROVIDE HYDRODYNAMIC; STABILITY AND CONTROL CHARACTERISTICS FOR A SUBMARINE CONFIGURATION IS EXAMINED.
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***VECTOR ANALYSIS**

RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION.
AD-275 473 DIV. 15

***VELOCITY**

A STUDY OF RADIATION FROM RE-ENTRY BODIES OF OPTICALLY-ACTIVE GASES; ANALYSIS OF BLUNT BODY; FLOW FIELDS AND THE RECOMBINATION REACTIONS OF AIR COUPLED WITH AERODYNAMICS OF THE FLOW.
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THE SLOW STEADY FLOW OF A VISCOUS INCOMPRESSIBLE ELECTRICALLY CONDUCTING FLUID ABOUT A UNIFORMLY MAGNETIZED SPHERE.
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***VERTICAL TAKE-OFF PLANES**

STATUS OF V/STOL TECHNOLOY. TILT-WING VTOL LOGISTIC TRANSPORTS FOR NAVY SUPPORT MISSIONS.
AD-275 307 DIV. 1

RESULTS OF WIND TUNNEL TESTS OF A FULL SCALE FUSELAGE MOUNTED TIP TURBINE DRIVEN LIFT FAN INCLUDE BASIC AIRPLANE PERFORMANCE (FAN OFF); FAN POWERED AIRCRAFT PERFORMANCE; AND FAN AERODYNAMIC PERFORMANCE.
AD-275 711 DIV. 9

***VIBRATION**

A STUDY OF RADIATION FROM RE-ENTRY BODIES OF OPTICALLY-ACTIVE GASES; ANALYSIS OF BLUNT BODY; FLOW FIELDS AND THE RECOMBINATION REACTIONS OF AIR COUPLED WITH AERODYNAMICS OF THE FLOW.
AD-275 389 DIV. 25

FREE CONVECTIVE HEAT TRANSFER AND COUPLED VIBRATIONS: BASIC EQUATIONS AND BOUNDARY CONDITIONS.
AD-275 770 DIV. 25

FREE CONVECTIVE HEAT TRANSFER: A COMPARISON OF THE INFLUENCE OF MECHANICAL AND ACOUSTIC VIBRATION.
AD-275 771 DIV. 25

FREE CONVECTIVE HEAT TRANSFER: THE LOCAL HEAT TRANSFER COEFFICIENT AROUND A HEATED HORIZONTAL CYLINDER IN AN INTENSE SOUND FIELD.
AD-275 772 DIV. 25

FREE CONVECTIVE HEAT TRANSFER UNDER THE INFLUENCE OF VIBRATION: THE MECHANISM OF THE INTERACTION.
AD-275 773 DIV. 25

***VIETNAM**

GEOGRAPHICAL AND CLIMATIC FACTORS ABOUT COASTAL BURMA; MALAYA; THAILAND; CAMBODIA; AND VIETNAM
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***VISCOSITY**

THE VARIATION IN VISCOELASTIC BEHAVIOR WITH TEMPERATURE OF A SERIES OF COPOLYMERS OF PHOSPHOROUS AND SULFUR.
AD-275 392 DIV. 4

THE SLOW STEADY FLOW OF A VISCOUS INCOMPRESSIBLE ELECTRICALLY CONDUCTING FLUID ABOUT A UNIFORMLY MAGNETIZED SPHERE.
AD-275 462 DIV. 25

NON-LINEAR EFFECTS OF TEMPERATURE VARIATION IN STRESS ANALYSIS OF ISOTHERMALLY LINEAR VISCOELASTIC MATERIALS. AS A PARTICULAR EXAMPLE POLYMETHYL-METHACRYLATE IS CONSIDERED.
AD-275 643 DIV. 14

***VOCABULARY**

A STATE-OF-THE-ART STUDY OF THEORY AND PRACTICE OF COORDINATE INDEXING WHICH COVERS NEARLY EVERY MECHANIZED SYSTEM. AN ANNOTATED BIBLIOGRAPHY OF SIGNIFICANT PAPERS PUBLISHED BETWEEN 1947 AND 1960.
AD-275 393 DIV. 32

STOCHASTIC MODELS FOR GRAMMARS OF NATURAL LANGUAGES ARE DISCUSSED.
AD-275 465 DIV. 32

***VOICE COMMUNICATION SYSTEMS**

DIGITAL COMMUNICATION STUDIES - COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY - ASYNCHRONOUS TIME - MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES.
AD-275 480 DIV. 5

PROPOSED METHODS FOR THE CALCULATION OF THE ARTICULATION INDEX ON A MEASURE TO CHECK THE ABILITY OF A COMMUNICATION SYSTEM TO TRANSMIT INTELLIGIBLE SPEECH.
AD-275 558 DIV. 5

***VOLTAGE**

A SYSTEM FOR MODULATING THE OUTPUT OF A THERMIONIC GENERATOR AND DELIVERING A HIGH VOLTAGE ALTERNATING CURRENT.
AD-275 516 DIV. 7

***VORTICES**

THE SLOW STEADY FLOW OF A VISCOUS INCOMPRESSIBLE ELECTRICALLY CONDUCTING FLUID ABOUT A UNIFORMLY MAGNETIZED SPHERE.
AD-275 462 DIV. 25

***WATER**

CHROMATOGRAPHIC; IR SPECTROSCOPY; PRESSURE BOMB; AND ELECTRICAL CONDUCTIVITY METHODS OF DETERMINING WATER CONTENT OF N2O4; UNSYMMETRICAL DIMETHYLHYDRAZINE; AND HYDRAZINE WERE EVALUATED. ELECTRICAL CONDUCTIVITY WAS MOST PROMISING.
AD-275 537 DIV. 10

***WATER WAVES**

WAVE REFRACTION DATA AND DIAGRAMS ARE PRESENTED FOR DIFFERENT PERIODS AND FROM VARIOUS DIRECTIONS ON ISLANDS OFF THE COAST OF THE YUCATAN PENINSULA IN THE GULF OF MEXICO.
AD-275 637 DIV. 2

DEVELOPMENT AND USE OF INSTRUMENTATION TECHNIQUE FOR MEASURING THE CHARACTERISTICS OF SURFACE WAVES IN THE OPEN OCEAN.
AD-275 815 DIV. 2

***WAVE ANALYSIS**

EQUATIONS ARE DERIVED FOR METEOROLOGICAL EFFECTS ON AN ACOUSTIC WAVE WITHIN A SOUND RANGING ARRAY.
AD-275 415 DIV. 2

DEVELOPMENT AND USE OF INSTRUMENTATION TECHNIQUE FOR MEASURING THE CHARACTERISTICS OF SURFACE WAVES IN THE OPEN OCEAN.
AD-275 815 DIV. 2

***WAVE TRANSMISSION**

ANALYSES OF SELECTED SURFACE WAVES EXCITATION FOR GUIDING ELECTROMAGNETIC ENERGY ARE PRESENTED.
AD-275 438 DIV. 25

ASPECTS OF THE PROPAGATION OF STRESS PULSES IN REAL VISCOELASTIC SOLIDS PULSE SHAPE; RESPONSE OF BODY; PULSE REFLECTION.
AD-275 729 DIV. 28

***WAVEFORM GENERATORS**

METHOD OF DERIVING ELECTRONIC SIMULATED SIGNAL AND NOISE VOLTAGES FOR EXPERIMENTAL DEVELOPMENT OF INFRARED SIGNAL PROCESSING CIRCUITRY; INFRARED DETECTOR THEORY AND COMPLETE SIMULATOR SYSTEM WITH THEORY AND EXPERIMENT.
AD-275 368 DIV. 6

A PHASE-CHANNEL COMBINER WHICH AUTOMATICALLY COMBINES THE PHASE CHANNELS INTO ONE UNAMBIGUOUS CHANNEL AND DEPICTS THE ANGLES OF ARRIVAL OF THE RADIO ENERGY FROM RADIO INTERFEROMETER TRACKED SATELLITES! DEVELOPED FOR THE NRL FENCE SPACE SURVEILLANCE SYSTEM.
AD-275 486 DIV. 6

***WAVEGUIDE IRISES**

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED; AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS; VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

***WAVEGUIDE SLOTS**

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED; AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS; VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

***WAVEGUIDES**

PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH POWER TRANSMISSION LINES IN A TRENCH COVERED BY COAL; COKE AND EARTH.
AD-275 390 DIV. 25

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED; AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS; VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

COMPONENTS AND TECHNIQUES FOR THE GENERATION; TRANSMISSION; AND DETECTION OF ENERGY IN THE 100 TO 300 GC FREQUENCY REGION WERE INVESTIGATED.
AD-275 576 DIV. 8

***WEAPONS**

MEANS THAT CONSIDER COST AND RELIABILITY TO DETERMINE WHETHER MONITORING OF NAVAL WEAPONS IN SERVICE IS JUSTIFIED; THIS IS FOR THE CONSIDERATION OF WEAPON DESIGNERS.
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***WEATHER FORECASTING**

A METHOD FOR FORECASTING STRONG AND GUSTY WINDS.
AD-275 387 DIV. 2

AN ANALYSIS OF MESONMETEOROLOGICAL NETWORKS AND SYSTEMS AND THE CONSIDERATION OF THE RELATIONSHIP O THUNDERSTORM ACTIVITY TO LOW-LEVEL WINDS.
AD-275 568 DIV. 2

REVISED TERMINAL WEATHER FORECASTING FILE ON TINKER AIR BASE: OKLAHOMA
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***WEATHER STATIONS**

RECOMMENDED PLANS FOR WEATHER STATION LAYOUT AND METEOROLOGICAL EQUIPMENT INSTALLATION FOR EIGHT EAST COAST LOCATIONS.
AD-275 355 DIV. 2

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PHYSICAL AND METALLURGICAL BEHAVIOR OF ARC WELDS IN ARMOR PLATE. STRESSES AND CRACKING OF WELDS DURING COOLING WITH RESTRAINED CONTRACTION.
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***WELDING**

A CURRENT LISTING OF SELECTED ABSTRACTS OF

DOCUMENTS AND ARTICLES ON DEFENSE METALS TO PROVIDE INFORMATION AND INFORMATION SOURCES TO GOVERNMENT CONTRACTORS.
AD-275 394 DIV. 17

FEASIBILITY STUDY OF THE ELECTRON BEAM WELDING OF AEROSPACE METALS IN CONTROLLED ATMOSPHERES (NON-VACUUM).
AD-275 548 DIV. 26

*WET CELLS

A HIGH VOLTAGE, GAS-ACTIVATED BATTERY WAS DESIGNED AND FABRICATED. THE ACTIVATING MECHANISM WAS A GAS GENERATOR INITIATED BY AN ELECTRIC PULSE. A DRY-CHARGED BATTERY HAS A KOH ELECTROLYTE.
AD-275 792 DIV. 7

*WIND

A METHOD FOR FORECASTING STRONG AND GUSTY WINDS.
AD-275 387 DIV. 2

CLIMATOLOGICAL DATA OF SCALAR WINDS, ZONAL AND MERIDIONAL WIND COMPONENTS, SEMIPLANAR WINDS AND WIND SHEAR AT 1 KM. ALTITUDE INTERVALS FOR FAIRBANKS, ALASKA.
AD-275 583 DIV. 2

THE TURBULENT WIND FIELD IN THE LEE OF MOUNTAIN RIDGES AND TREE LINES AS STUDIED BY TRACKING BALLOONS WITH THEODOLITES.
AD-275 611 DIV. 2

WAVE REFRACTION DATA AND DIAGRAMS ARE PRESENTED FOR DIFFERENT PERIODS AND FROM VARIOUS DIRECTIONS ON ISLANDS OFF THE COAST OF THE YUCATAN PENINSULA IN THE GULF OF MEXICO.
AD-275 637 DIV. 2

PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON WINDS FOR AEROSPACE VEHICLE DESIGN.
AD-275 846 DIV. 2

ANALYSIS OF ATMOSPHERIC TURBULENCE FROM MISSILE FLIGHT WIND MEASUREMENT.
AD-275 852 DIV. 2

PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON WINDS FOR AEROSPACE VEHICLE DESIGN.
AD-275 857 DIV. 2

*WIND TUNNEL NOZZLES

THE APPLICATION OF EQUATIONS TO COMPLEX REACTIONS IN EXHAUST GASES FOR USE IN DIGITAL COMPUTERS. THE FLOW OF THE GAS UNDERGOING FOUR REACTIONS IN THE DIVERGENT PORTION OF A NOZZLE IS CALCULATED.
AD-275 464 DIV. 9

*WIND TUNNELS

A BIBLIOGRAPHY OF ABSTRACTED REPORTS ORIGINATED BY AFSC. INCLUDES MANY SUBJECT AREAS, WITH EMPHASIS ON MISSILES AND THEIR COMPONENTS. VARIOUS TESTS OF DYNA-SOAR, NIKE-ZEUS, AND TITAN II. COVERS FIRST QUARTER, 1962.
AD-275 745 DIV. 12

*WINGS

A WIND TUNNEL INVESTIGATION OF TWO TYPES OF HOLE DISTRIBUTIONS FOR LAMINAR BOUNDARY LAYER CONTROL BY SUCTION.
AD-275 494 DIV. 9

*WIRE

THE EFFECTS OF THE CURRENT CARRYING CAPACITY OF SUPERCONDUCTORS UPON THE DIRECTION OF EXTERNALLY PRODUCED MAGNETIC FIELDS.
AD-275 396 DIV. 25

A BIBLIOGRAPHY OF 89 ABSTRACTED REPORTS OF RECENT (1959-1961) LITERATURE ON NON-DESTRUCTIVE TESTING OF ROCKET MOTOR CASES. THE LIST IS LIMITED TO STRUCTURES WOUND FROM WIRE AND FROM FILAMENTS OF GLASS FIBER-RESIN COMPOSITES.
AD-275 587 DIV. 12

*X BAND

A SLOTTED WAVEGUIDE ANTENNA WITH INDIVIDUAL RADIATORS EXCITED BY INDUCTIVE POSTS IS DESCRIBED AND COMPARED WITH SIMILAR TYPE ARRAYS. PERFORMANCE CHARACTERISTICS COMPARED INCLUDE RADIATION PATTERNS, VOLTAGE STANDING WAVE RATIOS AND BANDWIDTH.
AD-275 391 DIV. 8

*X-RAY DIFFRACTION ANALYSIS

SILVER BASE ALLOYS: EFFECTS OF SOLUTES ON THE OCCURRENCE OF STACKING FAULTS IN SILVER BASE ALLOYS; PRIMARY EFFECT OF ALLOYING CD, IN AND SN WITH AG IS TO INCREASE THE STACKING FAULT DENSITY IN FILINGS FROM PURE AG.
AD-275 809 DIV. 25

*X RAYS

SPECTROSCOPIC ANALYSIS OF SCATTERED X-RAYS FROM LITHIUM, LITHIUM OXIDE, LITHIUM FLUORIDE, BERYLLIUM AND BORON IRRADIATED BY COPPER TARGET RADIATION.
AD-275 883 DIV. 25

*ZINC ALLOYS

ALUMINUM BASE ALLOYS AL 1.7 AT .8 CU AND AL-5.3 AT .8 ZN: GUNIER-PRESTON ZONE FORMATION AND REVERSION.
AD-275 461 DIV. 17

MECHANICAL PROPERTY DATA FOR AL AND TI ALLOYS AT CRYOGENIC TEMPERATURES.
AD-275 483 DIV. 17

*ZIRCONIUM COMPOUNDS

ZIRCONIA - MAGNESIA REFRACTORIES AND BORON - SILICON MIXTURES - CHEMICAL ANALYSIS.
AD-275 506 DIV. 4

PHYSICAL AND ELECTRICAL PROPERTIES OF ZR CARBIDE AND B CRYSTALS. THERMIONIC, THERMAL EXPANSION AND THERMAL STABILITY MEASUREMENTS. PREPARATION AND PURIFICATION EFFECTS. TEST DIODE DESIGN.
AD-275 571 DIV. 14

*ZONE MELTING

PREPARATION OF HIGH PURITY BE SINGLE CRYSTALS AND FOILS AND A STUDY OF THEIR DEFORMATION AND FRACTURE CHARACTERISTICS. ZONE MELTING, AND COMPRESSION TENSION AND ELECTRICAL RESISTIVITY MEASUREMENTS.
AD-275 730 DIV. 17

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-275 382 Div. 1, 5, 6
(TISTA/VGW) OTS price $18.00

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
INFORMATION FLOW ANALYSIS OF A TRANSPORTABLE AIR TRAFFIC CONTROL SYSTEM.
Final rept.,
by F. B. Pogust, N. E. Freeberg and others.
Feb 62, 1v. incl. illus. tables, 53 refs.
(Rept. no. 9257-1)
(Contract AF 19(604)8370, Proj. 2124)
(AFCRL 62-111) Unclassified report

DESCRIPTORS: *Air traffic control systems, *Mobile, Ground support equipment, Surface to air, *Communication systems, *Radar equipment, Display systems, Air force communications, Military requirements.

A transportable air traffic control system (Augmented Four Wheels) was studied to determine: (1) The information flow in the system, (2) The quantity and type of information flowing, and (3) The ability of controllers to process this information. As a result of this study, an information flow diagram and a task analysis table were prepared. Advanced equipment is recommended for the future Emergency Mission Support System. (Author)

AD-275 386 Div. 1, 8
(TISTA/VGW) OTS price $13.50

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
PRELIMINARY FIELD TESTS OF K-BAND SCANNING-BEAM TECHNIQUE OF ELEVATION ANGLE MEASUREMENT.
Final rept.,
by F. H. Battle, Jr. Dec 61, 190p. incl. illus. tables (Rept. no. 8284-1)
(Contract FAA/BRD-172)
Unclassified report

DESCRIPTORS: K band, Radio beacons, *Glide path systems, All-weather aviation, *Instrument landings, Radio beams, Lobing, Tests, Effectiveness.

Several series of tests were made to evaluate the static performance of a technique of elevation-angle measurement based on airborne decoding of a narrow, scanning, Ku-band radio beam. The tests were made over airport terrain, since the technique is intended for use in an all-weather instrument landing system. Time-shared measurements using three scanning beams and a single airborne receiver are proposed as a full-scale landing guidance system. However, one or two scanning beams, especially for vertical angle measurements, can provide useful guidance for landings. The feasibility and accuracy of low-angle elevation measurements were investigated by these basic types of tests: (1) static and dynamic lobing, showing the magnitude of the effects of ground reflections on propagation of the scanning beam, (2) static and dynamic beamshape, showing the distortion of the received signal envelope caused by reflections, and (3) receiver angle readings, showing the over-all static accuracy of the experimental system. Each type of test was made at various distances and azimuths from the scanning antenna, and under varying conditions of ground moisture, vegetation, equipment installation and adjustments. The resulting data are plotted as functions of elevation angle. (Author)

AD-275 430 Div. 1
(TISTA/GEC) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
COLD-WEATHER ENVIRONMENTAL TESTS OF ROCKET CATAPULT MK 2 MOD 0 (AIRCRAFT EJECTION SEAT),
by Howard C. Schafer. May 62, 18p. incl. illus. tables, 8 refs. (NOTS TP 2858)
(NAVWEPS rept. no. 7875)
Unclassified report

DESCRIPTORS: *Ejection seats, *Catapults, Rocket propulsion, Low temperature research, Arctic regions, Climatic factors, Effectiveness, Jet fighters, Naval aircraft, Tests.

A series of cockpit environmental tests was conducted on one model of a rocket catapult used for pilot ejection to check winter temperature parameters. Major results are reported on the temperature environment within the cockpit of an F9F aircraft in an arctic environment. Severe low temperatures were obtained by keeping the canopy snow- and ice-free during part of the test period, which included the coldest part of the Alaskan winter. The report includes three tables and three graphs. Weather parameters are touched upon, as they tended to decrease minimum cockpit temperatures. Vertical temperature gradients on the rocket catapult are discussed. (Author)

AD-275 482 Div. 1, 27
(TISTA/WAW) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
PRELIMINARY SYSTEMS ANALYSIS FOR HOVERING VEHICLES,
by Ronald F. Dettling. 2 Apr 62, 10p. incl. illus. 2 refs. (NOTS TP 2829)
(NAVWEPS rept. no. 7821) Unclassified report

DESCRIPTORS: Aircraft, Rockets, *Rocket propulsion, Military requirements, Mathematical analysis, Differential equations, Thrust, Specific impulse, *Flying platforms.

A rapid method for calculating the required system weight ratio for a rocket-powered hovering vehicle is presented. Two cases are considered: the first for vehicles operating in a regime where specific impulse is essentially constant,

and the second for vehicles operating where the variation of specific impulse with thrust must be considered. An equation is also developed that yields total system weight as a function of payload weight, system weight ratio, and propulsion unit weight ratio. (Author)

AD-275 507 Div. 1, 18
(TISTA/GEC) OTS price $1.60

Operations Evaluation Group, Office of Naval Operations.
STATUS OF V/STOL TECHNOLOGY.
Interim rept.,
by R. H. Miller. 23 Apr 62, 17p. incl. illus. table (Interim research memo. no. 15)
Unclassified report

DESCRIPTORS: *Vertical take-off planes, *Short take-off planes, *Transport planes, Naval aircraft, Design, Naval logistics, Carrier landings, Naval operations, Operations research, Military requirements.

The mission and capabilities of a tilt-wing VTOL logistic transport, as required by the Navy, are discussed. The design parameters needed to fulfill these requirements as well as the current state of the art are presented.

AD-275 515 Div. 1, 12
(TISTA/WAW) OTS price $12.50

Systems Technology, Inc., Inglewood, Calif.
PERFORMANCE CRITERIA FOR LINEAR CONSTANT-COEFFICIENT SYSTEMS WITH DETERMINISTIC INPUTS,
by Julian Wolkovitch, Ray Magdaleno and others.
Feb 62, 159p. incl. illus. tables, 80 refs.
(Contract AF 33(616)7841, Proj. 8219)
(ASD TR 61-501) Unclassified report

DESCRIPTORS: *Airplanes, *Guided missiles, *Control systems, *Servo systems, Effectiveness, Errors, Military requirements, Design, Mathematical analysis, Operational calculus, Differential equations.

Performance measures and associated criteria for linear constant coefficient systems forced by deterministic inputs are investigated, with particular reference to flight control systems. It is shown that the application of performance measures is facilitated by substituting for the actual flight control system an equivalent low-order linearized system having similar dynamic characteristics. A critical survey of current performance measures is given, and new methods for the analytic evaluation of some indicial error measures are presented. (Author)

AD-275 519 Div. 1, 17
(TISTM/BRW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE POTENTIAL OF BERYLLIUM IN SUPERSONIC COMMERCIAL AIRCRAFT,
by George A. Hoffman. May 62, 21p. incl. illus. tables, 12 refs. (Memo. no. RM-3094-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Commercial planes, *Supersonic planes, *Transport planes, *Beryllium, Mechanical properties, High temperature research, Sheets, Extrusion, Forging, Airplane panels, Sandwich panels, Metal plates, Costs.

A structural comparison is made of Be with the best alloys of Al, Ti, and steel for a variety of applications in supersonic transports. Such applications include components whose design is governed by tension criteria, by compression in stiffened and sandwich panels and in unstiffened plates, and by notched behavior, all over the temperature range to be encountered in future aircraft. It is inferred that a Be structural part might weigh from 1/4 to 1/2 less than the equal-function part made of more conventional metals. Calculations of the economics of Be usage in aircraft follow, consisting of several derivations of the worth-in-use of the weight reduction in commercial transports obtained by substituting a lighter-weight, but costlier, Be component. It is concluded that Be would offer many economic and weight-reducing advantages for transports. (Author)

AD-275 707 Div. 1, 19
(TISTA/WAW) OTS price $15.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
DYNAMIC SIMULATION STUDIES OF PICTORIAL NAVIGATION DISPLAYS AS AIDS TO AIR TRAFFIC CONTROL IN A HIGH-DENSITY TERMINAL AREA AND A MEDIUM-DENSITY TERMINAL AREA.
Interim rept.,
by Walter E. Faison and Andrew L. Sluka. Nov 61, 239p. incl. illus. tables.
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Air traffic control systems, Aircraft equipment, *Cockpits, *Display systems, Flight instruments, Electronic equipment, Air traffic controllers, Simulation, Human engineering, Tests.

An evaluation to determine the effect of cockpit pictorial displays on system operation in representative high-density and medium-density terminal areas is described. The representative areas of study were New York and Kansas City. Simulation of present-day control methods and procedures provided a basis for comparison against tests in which varying percentages of the traffic were equipped with pictorial display capabilities. A description of the various applications of pictorial displays, along with an evaluation of the related values, procedures, route structures and techniques, is included. The nature and distribution of air movements include arrivals, departures, overflights, and all types of aircraft currently using each airfield. Major improvements were in the areas of reduced controller workload and an increased ability to manipulate traffic. The pictorial display routes, procedures, and techniques can be systematically integrated with the existing system. (Author)

AD-275 727 Div. 1, 30
(TISTA/GEC) OTS price $5.60

Air Force Flight Test Center, Edwards Air Force Base, Calif.
AFFTC AEROSPACE INSTRUMENTATION HANDBOOK,
by Emil Henrich, Edwin Brown and others.
18 May 62, 51p. incl. illus. tables.
Unclassified report

DESCRIPTORS: Aircraft, Spaceships, Satellite vehicles, Guided missiles, Space capsules, Photographic recording systems, Magnetic recording systems, Electronic recording systems,

Telemeter systems, Transducers, Signals, Modulation, Time signals, Time switches, Tracking, Data processing systems, Closed-cycle ecological systems, *Handbooks, *Instrumentation, *Flight instruments, Aircraft equipment.

This Aerospace Instrumentation Handbook covers on-board recording; radiation techniques; transducers; signal conditioning equipment; modulation; tracking, receiving, and data processing; and bioastronautics and bioinstrumentation.

AD-275 875 Div. 1, 30
(TISTA/VGW) OTS price $3.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
ACTIVITY REPORT.
Apr 62, 27p. incl. illus.
(ESD TDR 62-22)
Unclassified report

DESCRIPTORS: Airports, *Airport radar systems, *Ground controlled approach radar, Radio beams, Glide path systems, Runway lights, *Air traffic control systems, Display systems, Fog, Simulation, *Doppler navigation.

This report briefly describes some of the tasks and studies conducted at National Aviation Facilities Experimental Center (NAFEC), Atlantic City, N. J. (Author)

AD-275 888 Div. 1, 19
(TISTA/WAW) OTS price $19.75

Federal Aviation Agency, Washington, D. C.
INTERNATIONAL AVIATION RESEARCH AND DEVELOPMENT SYMPOSIUM APRIL 10-14, 1961, ATLANTIC CITY, N. J. REPORT OF THE PROCEEDINGS.
1961, 361p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Air traffic control systems, *Symposia, Simulation, Radar beacons, Radar tracking, Data processing systems, Display systems, Aviation safety, Radar, Automatic, Radio communication systems, Doppler radar, Doppler navigation, Hyperbolic navigation, Design.

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-275 355 Div. 2, 30
(TISTP/GRW) OTS price $12.00

Tele-Dynamics Div., American Bosch Arma Corp., Philadelphia, Pa.
STATION LAYOUT AND EQUIPMENT INSTALLATION FOR TEST NETWORK. WEATHER OBSERVING AND FORECASTING SYSTEM 433L.
6 Sep 60, 1v. incl. illus. tables (Rept. no. WSC-E4-2)
(Subcontract to United Aircraft Corp., East Hartford, Conn., Contract AF 30(635)14459; In cooperation with Dunlap and Associates, Inc.)
(AFCCDD TN 60-38; FAA/BRD D2-903-4; USWB/CAWSD 900-3)
Unclassified report

DESCRIPTORS: *Weather stations, Design, Construction, Meteorological instruments, Installation.

AD-275 387 Div. 2
(TISTP/TL) OTS price $2.60

Crow, Loren W., Denver, Colo.
OBJECTIVE FORECAST METHOD FOR FORECASTING STRONG AND GUSTY SURFACE WINDS AT STEAD AIR FORCE BASE, RENO, NEVADA, OCTOBER THROUGH JUNE,
by Loren W. Crow. 7 Jan 60, 18p. incl. illus. tables.
(Contract AF 11(625)281)
Unclassified report

DESCRIPTORS: *Weather forecasting, Surfaces, *Wind, *Nevada, Air, Gusts, Measurement, *Diurnal variations, Meteorology, Meteorological data, Analysis.

This analysis outlines an objective-type technique to be used as a tool in preparing strong and gusty wind forecasts. The technique was developed from a thorough examination of weather patterns and upper air measurements which prevailed prior to the actual occurrences of high winds during a five-season (October through June) historical period. The technique was then tested by applying it to one season of independent data. (Author)

AD-275 415 Div. 2
(TISTP/GRW) OTS price $2.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
METEOROLOGICAL EFFECTS ON AN ACOUSTIC WAVE WITHIN A SOUND RANGING ARRAY,
by Emmit E. Fisher, Robert P. Lee, and Henry Rachele. May 62, 20p. incl. illus. 8 refs.
(Technical rept. no. MM-435)
Unclassified report

DESCRIPTORS: *Meteorological data, *Wave analysis, *Sound ranging, Least squares method, Geometry, Microphones, Sound transmission.

Equations are derived for determining the direction cosines of a plane or spherical wave front by assuming the arrival time at each microphone in an array to be an independent observation and requiring that the sum of the squares of the corrections to the individual recordings be a minimum. In addition, the effects on the direction cosines and/or the time arrival errors resulting from considering speed of sound variations (profile) with height are also considered. In particular, five examples were considered for different profiles, none of which were extreme, and resulted in direction angle errors as large as two degrees and apparent time errors on the order of .04 second. (Author)

AD-275 429 Div. 2
(TISTP/GRW) OTS price $4.60

California U., Berkeley.
SOLAR FLARE X-RAY BURST ON 28 SEPTEMBER 1961,
by K. A. Anderson and J. R. Winckler. 1962, 40p. incl. illus. tables, 13 refs.
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: Intensity, *Solar flares, X-rays, Bremsstrahlung, Detection, Balloons, Exosphere.

The importance three flare of 28 September 1961 was exceptionally intense in its production of H alpha light. It also emitted a burst of X-rays observed by high-altitude, balloon-borne detectors. The burst had a small precursor, a very rapid rise, and a three component decay. The main part of the burst is interpreted as being made up of three separate pulses. The X-ray

burst shows two remarkable assocations with the flare's radio noise emission: (1) Microwave bursts at the highest radio frequencies coincide precisely in time with precursor and the main peak. (2) Groups of type III bursts occur at or near the time of discontinuities in the decay of the X-ray burst and thus are associated with the leading edges of the three energetic electron pulses whose bremsstrahlung constitutes the observed X-ray flux. The appearance of both type III radiation originating in the corona at about 100,000 Km and bremsstrahlung X-rays which cannot reasonably be produced above roughly 5000-Km height in the chromosphere gives strong evidence that energetic electrons undergo large scale motions in the solar atmosphere during chromospheric flares. A detailed analysis of the spectral time variation shows that the solar electrons must spend most of their time above the 10,000-Km level. (Author)

AD-275 476 Div. 2
(TISTP/GRW) OTS price $13.50

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
ANALYSIS OF GEOGRAPHIC AND CLIMATIC FACTORS IN COASTAL SOUTHEAST ASIA.
Final rept.
Mar 62, 182p. incl. illus. tables (Rept. no. 04231-1-F)
(Contract DA 19-129-qm-1655)
Unclassified report

DESCRIPTORS: *Climate, *Geography, *Burma, *Thailand, *Cambodia, *Malaya, Beaches, *Vietnam.

A description of a 50-mile-wide strip around the coast of Southeast Asia from Pakistan to China is presented. The topics included are: offshore water depths; coastal analysis; land surface with separate studies of relative relief and slope angles; climate and weather with detailed statistics of some weather stations; vegetative cover with a special study of trafficability of rice paddies in Malaya; soils, described by separate countries; a quantified study of the road system with an interesting new technique for appraisal; and native animals and diseases of importance to military operations. (Author)

AD-275 502 Div. 2
(TISTP/GRW) OTS price $11.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
POINT BARROW TRIALS. FY 1959. INVESTIGATIONS ON THICKENED SEA ICE,
by J. E. Dykins and A. I. Funai. 23 Apr 62, 142p. incl. illus. tables, 10 refs. (Technical rept. no. R 185)
Unclassified report

DESCRIPTORS: *Ice, Thickness, Simulation, Alaska, Test methods.

During the winter of 1958-59, trials were conducted at Point Barrow, Alaska, to investigate techniques for increasing the thickness of sea ice. Several test pads were constructed on a natural ice sheet by various experimental methods. Each technique was studied from the standpoint of the construction problems involved and certain characteristics of the ice produced. The temperatures, salinities, densities, and strengths of the various types of constructed sea ice were compared with those of natural sea ice. Basically, three methods of surface-thickening natural sea ice were investigated: confined flooding, free flooding, and spraying and sprinkling. Free flooding was the most promising of the techniques studied. (Author)

AD-275 547 Div. 2, 20
(TISTP/GRW) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIATION MEASUREMENTS WITH BALLOONS, 1961.
Final rept.
Apr 62, 57p. incl. illus. 9 refs.
(Contract AF 29(600)2361)
(ARL TDR 62-2) Unclassified report

DESCRIPTORS: *Solar flares, *Radiation counters, Proton counters, Neutron counters, Scintillation counters, Airborne, Balloons, Stratosphere, Ionosphere.

A group of radiation detectors for monitoring solar-flare radiation in the upper atmosphere was flown on a series of balloon flights to altitudes of about 125,000 ft at Bemidji, Minnesota, during the summer of 1961. The instruments consisted of a scintillation telescope to measure high fluxes of protons between 10 and 70 Mev, two neutron detectors to have different neutron detection efficiencies, and a shielded geiger-counter monitor. Balloons were flown both during a period of solar disturbance and during a day of normal activity. The neutron counting rates observed in both neutron detectors as a function of altitude and time are compared for all flights. In addition, the neutron counting rates observed on a day of normal activity are compared with the neutron fluxes calculated assuming a source of neutrons produced only by primary cosmic rays interacting in the atmosphere. The calculated and experimentally observed fluxes are in reasonably good agreement. Because of an electronic malfunction, the information obtained from the proton telescope was considered unreliable. (Author)

AD-275 553 Div. 2, 15
(TISTP/MFA) OTS price $10.10

Army Ordnance Missile Command, Huntsville, Ala.
AOMC CLIMATOLOGICAL RINGBOOK. PART XVII. EMPIRICAL FREQUENCY DISTRIBUTIONS OF WIND COMPONENTS AT CONSTANT ALTITUDE LEVELS, FAIRBANKS, ALASKA,
by Werner H. Alfuth and Armstead P. Alsobrook.
31 Oct 61, 121p. incl. tables (Rept. no. RR-TR-61-21)
Unclassified report

DESCRIPTORS: *Meteorology, *Wind, *Frequency, *Distribution, *Tables, Height finding, Pressure, Velocity, Temperature, Density, Data processing systems, Atmosphere, Computers, Statistical analysis, Punched card methods, Probability, Statistical distributions, Alaska.

Climatological parameters of scalar winds, zonal and meridional wind components, semiplanar winds and wind shear at 1 km altitude intervals for the location Fairbanks, Alaska are presented. The frequency distributions were established for the 12 monthly and the annual reference periods with values of cumulative percentage frequency corresponding to the mean and plus and minus one, two and three sigma levels of normal distribution. The statistical information is based on the observational period 1951 - 1957. (Author)

AD-275 568 Div. 2
(TISTP/MFA) OTS price $4.60

Chicago U., Ill.
MESOMETEOROLOGICAL STUDY OF SELECTED AREAS IN THE UNITED STATES.
Semiannual rept., 1 Sep 61-28 Feb 62,
by Henry A. Brown and William Bonner. 28 Feb 62,

18p. incl. illus. refs.
(Contract DA 36-039-sc-88932, Proj. 3A99-27-005-04)

Unclassified report

DESCRIPTORS: *Storms, *Meteorological data, *Weather forecasting, *Atmosphere, New Jersey, Arizona, Texas, Oklahoma, Surface properties, Humidity, Pressure, Precipitation, Wind, Temperature.

Analysis of the squall line that developed and moved over the Texas-Oklahoma Severe Local Storms Network on June 23, 1957 revealed the origin and life history of the mesosystem. Originally a post-cold frontal system, it grew rapidly in size and intensity and finally extended beyond the cold front into the warm sector. In addition to the customary phenomena that accompany a squall line, another feature, the humidity dip, was noted. This dip, previously discussed as a microscale feature, had mesoscale dimensions. The association of the dip with other meteorological variables is examined. The possible origins are considered and the implications of the presence of the dip to the life cycle, moisture and energy budgets, and cold air production of the squall line are discussed. Field operation plans are detailed to obtain more comprehensive data on the moisture and temperature fields preceding, during and following squall line - humidity dip passage. The plans are based on the utilization of the Cedar Hills television tower (1430 feet) for determination of continuous measurements at a number of levels. Horizontal surface variations will be obtained from a micronetwork and mesonetwork surrounding the tower. (Author)

AD-275 590 Div. 2
(TISTP/GRW) OTS price $8.10

North American Aviation, Inc., Downey, Calif.
PROCEEDINGS OF THE LUNAR AND PLANETARY EXPLORATION COLLOQUIUM. VOLUME III, NUMBER 1.
15 May 62, 84p. incl. illus. tables, refs.

Unclassified report

Publication of the Eleventh Lunar and Planetary Exploration Colloquium meeting held at the Lockheed Employees' Recreation Club Auditorium in Burbank, California, on 28 and 29 November 1961.

DESCRIPTORS: Conferences, *Planetary atmospheres, *Moon, *Solar flares, Venus, Extraterrestrial geography.

AD-275 594 Div. 2
(TISTB/AW) OTS price $6.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
A BIBLIOGRAPHY OF SEISMOLOGY FOR THE VELA UNIFORM PROGRAM.
Rept. of VESIAC.
Apr 62, 67p. (Rept. no. 4410-10-B2; Addendum to Rept. no. 4410-10-B, AD-267 979)
(Contract SD-78)

Unclassified report

DESCRIPTORS: *Bibliography, *Earthquakes, *Seismic waves, *Underground explosions, Detection, Explosions, Underwater explosions, Electromagnetic waves, Geophysics.

This first addendum to A Bibliography of Seismology for the VELA UNIFORM Program contains abstracts for approximately 150 additional publications on seismology and the detection of underground explosions. The addendum, like the Bibliography, has two main parts: author-title listing by subject, and abstracts of publications cited. (Author)

AD-275 611 Div. 2
(TISTP/GRW) OTS price $8.10

New York U. Coll. of Engineering, N. Y.
LOCAL WIND CIRCULATIONS. VOLUME II. STUDIES OF THE FIELD OF TURBULENCE IN THE LEE OF MOUNTAIN RIDGES AND TREE LINES.
Final rept., 1 July 60-30 Sep 61,
by Ben Davidson and James Halitsky. 30 Sep 61, 76p. incl. illus. tables, refs.
(Contract DA 36-039-sc-84939, Proj. 3A99-07-001-03)

Unclassified report

DESCRIPTORS: Atmosphere, *Wind, Turbulence, *Mountains, *Trees, Fluid mechanics, Balloons, Tracking, Theodolites.

Results of a number of experiments designed to probe the field of turbulence in the lee of 600 m high ridges are presented. Turbulence fields above the slopes are compared with those obtained in mid-valley under a variety of stability conditions. The results of an experiment designed to study the field of turbulence downwind of a line of trees are also given. (Author)

AD-275 637 Div. 2
(TISTP/MFA) OTS price $11.00

Texas A. and M. Coll., College Station.
WAVE REFRACTION AND WAVE ENERGY ON CAYO ARENAS, CAMPECHE BANK,
by Donald E. Walsh, Robert O. Reid, and Richard G. Bader. Apr 62, 150p. incl. illus. tables, 83 refs. (Ref. no. 62-6T)
(Contract Nonr-211904)

Unclassified report

DESCRIPTORS: *Oceanography, *Water waves, Ocean currents, *Refraction, Caribbean Islands, Gulf of Mexico, *Wind, Energy, Time, Frequency, Sedimentation, Particles, Motion, Probability, Velocity.

Wave refraction diagrams are constructed for waves of three different periods coming from various directions as they arrive at each of the three island complexes that make up Cayo Arenas reef in the Gulf of Mexico. From these diagrams, the wave heights, Hb, and depths, db, of breaking are determined for various zones around the three island complexes. Using either oscillatory or solitary wave theory where appropriate, the kinetic energy both outside and immediately within the breaker zone is calculated for the various zones making up each of the island complexes. From these kinetic energy summations and the area and perimeter of the breaker zones for each island complex, a quantity herein called the power of the waves is computed. This quantity is actually a measure of the influx of energy into the area per unit time per unit area of the sea floor. Finally a short discussion of the quantities required to determine the probability of occurrence of a given wind system is included. This information is needed before any final decision can be made as to which wave system brings the greatest amount of energy to bear on the reef over long periods of time. (Author)

AD-275 723 Div. 2
(TISTA/GEC) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PLANETARY DISTRIBUTION OF MAGNETIC IONOSPHERIC DISTURBANCES,
by A. P. Nikol'skiy. 6 Apr 62, 26p. incl.

illus. table, 17 refs. (Trans. no. FTD-TT-61-307 of Trudy Arkticheskogo i Antarkticheskogo Nauchno-Issledovatel'skogo Institute, 223, no. 3 pp. 5-20, 1960)
Unclassified report

Part of a rept. presented at the 11th Assembly of the IUGG (International Union of Geodesy and Geophysics), Canada, 1957.

DESCRIPTORS: Solar energy, Radiation effects, Terrestrial magnetism, Magnetic fields, *Magnetic storms, *Ionospheric disturbances, Aurorae, Theory.

A comparison is made of the theory that the cause of irregular disturbances of the earth's magnetic field is solar corpuscles penetrating the ionosphere, and observations and experimental data. The movement of electrically charged particles in the field of a magnetic dipole substantiates the observations and theory.

AD-275 725 Div. 2
(TISTP/GRW) OTS price $9.60

Air Weather Service, Scott Air Force Base, Ill.
TERMINAL FORECASTING REFERENCE FILE, TINKER AIR FORCE BASE, OKLAHOMA CITY, OKLAHOMA.
Jan 62, 118p. incl. illus. tables, 12 refs.
Unclassified report

DESCRIPTORS: *Weather forecasting, Oklahoma, *Airports, Meteorological data.

AD-275 815 Div. 2
(TISTP/MFA) OTS price $5.60

General Dynamics/Convair, San Diego, Calif.
SURFACE WAVES ON THE OCEAN.
Final rept.,
by P. F. R. Weyers, S. D. Hays, and C. G. McIlwraith. May 62, 50p. incl. illus. (Rept. no. GDC 62-138)
(Contract Nonr-261200)
Unclassified report

DESCRIPTORS: *Oceanography, *Water waves, *Wave analysis, Depth indicators, Height finding, Measurement, *Instrumentation, Tests, Reliability, Time, Sequences, Data processing systems, Data transmission systems, Computer logic, Telemetering, Oceanographic data, Sonar equipment, Ocean bottom.

A bottom-mounted narrow-beam active sonar has been designed, built and operated to measure wave height in the open ocean. The experiments were carried out at a depth of 145 feet. The apparatus is capable of measuring wave height at depths ranging from 25 to 200 feet without modification, and to 500 feet with a minimum of development. The amplitude resolution of the wave measurements was a fraction of 1 inch, and the spatial resolution on the surface of the ocean was approximately 24 inches. The wave data has been processed by digital methods, and the autocorrelation functions and power spectra of the ocean waves have been computed. The experiments have shown that it is possible to measure the statistical properties of surface waves in the ocean with great precision. It has also been shown that the instrumentation has high reliability and longevity. An induced surface wave pattern was not generated for measurement at this time due to geographic location and shallowness of water in the instrumented area. It is believed, however, that the apparatus is fully capable of making such measurements, and it is recommended that induced surface wave pattern studies be carried out in the future. (Author)

AD-275 846 Div. 2, 12
(TISTA/WAW) OTS price $17.50

Air Force Cambridge Research Labs., Bedford, Mass.
PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON WINDS FOR AEROSPACE VEHICLE DESIGN. VOLUME II,
by N. Sissenwine and H. G. Kasten. Mar 62, 269p. incl. illus. tables, refs. (Air Force Surveys in Geophysics no. 140, vol. 2; AFCRL 62-273, vol. 2)
Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, *Guided missiles, *Rockets, *Booster rockets, *Satellite vehicles, *Spaceships, Design, *Wind, *Meteorology, Launching, Airframes, Load distribution, Control systems, Measurement, Aerodynamics, Symposia.

AD-275 852 Div. 2
(TISTP/TL) OTS price $4.60

Army Ordnance Missile Command, Redstone Arsenal, Huntsville, Ala.
ANALYSIS OF ATMOSPHERIC TURBULENCE FROM MISSILE FLIGHT WIND MEASUREMENTS,
by Oskar M. Essenwanger. 31 Aug 61, 47p. incl. illus. tables, 16 refs. (Rept. no. RR-TR-61-7)
Unclassified report

DESCRIPTORS: *Atmosphere, *Turbulence, Guided missiles, Flight testing, *Wind, Measurement, Instrumentation, Errors, Analysis.

The split of an instantaneous wind profile into its mean (quasi-steady) profile and its non-stationary components is discussed. It is shown that two mathematical conditions can be established for this separation procedure. First, the sum of the remaining fluctuations must be zero, if the variations represent turbulence. Secondly, it may be postulated that the first lag correlation be positive, and the second one negative for a 23 point analysis. The separation of the mean profile from the turbulent part is demonstrated on hand of an example for data of the JUPITER Missile Flight 30 between 400 and 3000 m altitude from 12 m height interval recordings. (Author)

AD-275 857 Div. 2, 12
(TISTA/WAW) OTS price $16.00

Air Force Cambridge Research Labs., Bedford, Mass.
PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON WINDS FOR AEROSPACE VEHICLE DESIGN, VOLUME I,
by N. Sissenwine and H. G. Kasten. Mar 62, 233p. incl. illus. tables, refs. (Air Force Surveys in Geophysics no. 140, vol. 1; AFCRL 62-273, vol. 1)
Unclassified report

A Symposium on Winds for Aerospace Vehicle Design was held on 27-28 September 1961 at Laurence G. Hanscom Field, Bedford, Massachusetts.

DESCRIPTORS: *Hypervelocity vehicles, *Guided missiles, *Rockets, *Satellite vehicles, Design, *Wind, *Meteorology, Measurement, Statistical analysis, Launching, Aerodynamics, Elasticity, *Symposia, Jet streams (Meteorology), Vibration, Instrumentation, *Booster rockets, *Spaceships.

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-275 392 Div. 4, 25
(TISTM/REB) OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
THE VISCOELASTIC PROPERTIES OF SULPHUR-PHOSPHOROUS COPOLYMERS,
by A. V. Tobolsky, J. P. Mercier and G. D. T. Owen. 7 May 62, 12p. incl. illus. 8 refs.
(Technical rept. no. RLT-44)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Polymers, *Sulfur, *Phosphorus, Copolymerization, *Viscosity, *Elasticity, Temperature.

The introduction of small quantities of phosphorus greatly affected the viscoelastic properties of polymeric sulfur as demonstrated by a study of the modulus-temperature curves for a series of sulfur-phosphorous copolymers. The crosslinking action of phosphorus is counteracted by the weakness of the polymeric S-S bond which, unlike common organic crosslinked polymers, permits chemical flow by bond interchange. The region of chemical flow occurred in the same temperature range for P-S copolymers as for As-S copolymers and also crosslinked poly(ethylene tetrasulfide). (Author)

AD-275 452 Div. 4
(TISTM/REB) OTS price $3.60

Madrid U. (Spain).
THERMOCHEMICAL INVESTIGATIONS OF ALKYLSUBSTITUTED BENZOIC ACIDS.
Annual technical rept. no. 3, 1 Jan-31 Dec 61,
by M. Colomina, R. Perez-Ossorio and others.
31 Dec 61, 38p. incl. illus. tables, 28 refs.
(Contract DA 91-591-EUC-1677)
Unclassified report

DESCRIPTORS: *Thermochemistry, *Heat of reaction, Synthesis, Methyl radicals, Ethyl radicals, Propyl radicals, Butyl radicals, *Benzoic acids, Alkyl radicals, *Combustion, *Heat of formation.

A thermochemical study of the alkylsubstituted benzoic acids was undertaken as a contribution to basic thermodynamic information on pure organic compounds. The study included thermochemical data for two polymethyl and seven alkylbenzoic acids, containing alkyl groups higher than methyl. Nine acids were synthesised and purified to a high degree, in the first place by vacuum sublimation and subsequently by zone-melting. The qualitative control of purity with heating curves, following Skau's method showed that these compounds were of a high degree of purity. The heats of combustion of the compounds were determined by burning sample pellets in a bomb, at constant volume. From these values, the heats of formation were computed. (Author)

AD-275 506 Div. 4, 14
(TISTM/EJH) OTS price $1.25

Owens-Illinois Glass Co., Toledo, Ohio.
ANALYTICAL METHODS APPLICABLE TO ZIRCONIA OXIDE AND BORON-SILICON REFRACTORIES.
Rept. on Surface and Interface Phenomena of Matter,
by Paul T. Close, M. T. Watson, and C. H. Drummond. Dec 61, 49p. incl. illus. tables, 15 refs.
(Contract AF 33(616)7431, Proj. 7022)
(ARL-180) Unclassified report

DESCRIPTORS: *Refractory materials, *Ceramic materials, Mixtures, *Chemical analysis, Colorimetric analysis, Titration, Spectrographic analysis, *Zirconium compounds, *Magnesium compounds, *Oxides, *Boron, *Silicon, Silicon compounds, Borides, Boron compounds, Nitrides.

A complete evaluation of the analytical methods employed in the analyses of zirconia-magnesia refractories and of boron-silicon mixtures is presented. Also presented is the analytical data of submitted samples. Preferred methods of analyses for ZrO_2.MgO refractories are: (1) For ZrO_2, precipitation by mandelic acid. (2) Silica by silico-molybdate colorimetry. (3) MgO by phosphate. (4) For the determination of free MgO, a method of short digestion period followed by EDTA (disodium ethylene diamine tetracetate) titration is recommended. Methods found suitable for analysis of the boron-silicon system are: (1) Si by sodium carbonate-nitrate fusion and dehydration as silicic acid. (2) B by a similar fusion, precipitation of Si, and titration of Boric Acid. (3) N by a caustic fusion and determination as NH_3.(4) O by fluorination and measurement of the released gas. (Author)

AD-275 607 Div. 4, 16
(TISTM/EJH) OTS price $5.60

New Mexico U., Albuquerque.
SYNTHESIS OF HETEROCYCLIC β-MERCAPTOETHYL COMPOUNDS AS POTENTIAL RADIATION PROTECTION AGENTS.
Final rept., 16 Mar 60-15 Mar 62,
by Raymond N. Castle. 15 May 62, 51p. incl. illus. tables.
(Contract DA 49-193-md-2105)
Unclassified report

DESCRIPTORS: *Heterocyclic compounds, *Pyridines, *Pyrimidines, Phthalic acids, *Nitrogen compounds, Azo radicals, *Benzimidazoles, Imides, *Thiols, *Sulfonates, Ethyl radicals, Propyl radicals, Synthesis, Molecular structure, Radiation effects, *Radioprotective drugs.

Identifiers: Bunte salts.

The synthesis of beta-mercaptoethyl- and gamma-mercaptopropylheterocycles is reported. They were submitted for antiradiation testing. Selected Bunte salts were prepared for antiradiation testing. Beta-Mercaptoethylaminoheterocycles were also prepared for antiradiation testing as well as some Bunte salts of these types of compounds. The heterocyclic ring systems that were studied in this investigation are: (1) pyridine, (2) pyrimidine, (3) phthalazine, (4) quinazoline, (5) cinnoline, (6) quinoxaline, (7) pyridazine, and (8) benzimidazole. Ring systems (1), (2), (3), (4), (7), and (8) yielded compounds for antiradiation testing. Attempts to prepare aliphatic amine oxide Bunte salts were not successful. Some fundamental chemistry on other ring systems is included which came from attempts to prepare certain individual compounds for antiradiation testing. Outstanding among these is the previously unreported imidazo[2,3-a]phthalazine ring system. (Author)

AD-275 608 Div. 4
(TISTM/TCG) OTS price $1.60

North Carolina U., Chapel Hill.
THE PREPARATION AND PROPERTIES OF SOME OXOVANADIUM(IV) COMPLEXES,
by S. M. Horner, S. Y. Tyree, and D. L. Venezky.

14 May 62, 11p. incl. tables (Technical rept. no. 9)
(Contract Nonr-85505)
Unclassified report

DESCRIPTORS: *Vanadium compounds, *Oxides, *Complex compounds, Perchlorates, Oxychlorides, Pyridines, Phenyl radicals, Phosphine oxides, Arsenides, Methyl radicals, Sulfoxides, Synthesis, Molecular structure, Infrared spectroscopy, Magnetic moments, Measurement, Conductivity.

The preparation of the complexes VO(ClO4)2·5C5H5NO, VOCl2·2(C6H5)3PO, VO(ClO4)2·4(C6H5)3PO, VOCl2·4(C6H5)3AsO, VO(ClO4)2·4(C6H5)3AsO, and VOCl2·3(CH3)2SO are reported. Arguments for structural assumptions are based upon measurements of their visible and infrared spectra, magnetic moments, and conductance in polar solvents. (Author)

AD-275 618 Div. 4
(TISTM/TCG) OTS price $7.60

Pennsalt Chemicals Corp., Philadelphia, Pa.
INORGANIC CHELATING AGENTS.
Rept. for 15 Apr 59-15 May 62,
by B. P. Block and I. C. Popoff. May 62, 61p. incl. illus. (Technical rept. no. 30)
(Contract Nonr-268700)
Unclassified report

DESCRIPTORS: *Inorganic substances, *Chelate compounds, *Complex compounds, Oxygen compounds, Nitrogen compounds, *Silicon compounds, Carbon compounds, *Sulphur compounds, *Phosphorus compounds, Synthesis, Amines, Phosphine oxides, Phenyl radicals, Methyl radicals, Zinc, Silicon, Sulphur, Phosphorus, Temperature, Stability, Chemical analysis, Infrared spectroscopy.

Theoretical reasons are advanced for the selection of compounds based on O, N, Si, C, S, and P as coordinating agents capable of yielding thermally stable chelates. There are no C-to-C bonds in the chelate rings that might be formed by the compounds based on O-S-C-N, O-S-C-S-O, O-Si-C-N, O-Si-O-Si-O, O-Si-C-Si-O, O-Si-C-P-O, O-P-C-N, and O-P-C-P-O patterns selected for investigation. Initial results indicate that the O-P-C-N and O-P-C-P-O patterns are the most promising. The AB-type ligands NH2CH2P(O)(OH)R (where R is Me or Ph) and Ph2P(O)CH2P(O)(OH)Ph were synthesized and found to coordinate readily with Zn, yielding chelates with better stability than completely organic AB-type ligands. Other compounds prepared as potential ligands include NH2CH2SO3H, PhCH2SOCH2SOCH2Ph, Me2Si(OH)OSi(OH)-Me2, Me2Si(OEt)CH2Si(OEt)Me2, Me2Si(OH)CH2-Si(OH)Me2, NH2CH(Ph)P(O)(OH)2, NH2CH2P(O)(OH)2, NH2C(O)P(O)(OH)R (where R is Me or Ph), and HN2CH2P(O)Ph2. (Author)

AD-275 633 Div. 4, 14
(TISTM/TCG) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
SPECIALTY SILICONE ELASTOMERS.
Final rept.,
by S. A. Fuqua and R. M. Silverstein. 25 Apr 62, 35p. incl. illus. table, 9 refs.
(Contract DA 11-070-508-ORD-906, Proj. TB4-0041)
Unclassified report

DESCRIPTORS: *Elastomers, *Silicones, *Silanes, *Fluorides, Polymerization, Synthesis, Ethanes, Methyl radicals, Phenyl radicals, Bromine compounds, Hydrolysis, Propanes.

The synthesis and polymerization of a new class of silane monomers, the alpha, omega-bis(ethoxydimethylsilyl)-phenyl)-perfluoroalkanes, is reported. These were prepared from the intermediate alpha, omega-bis(bromophenyl)-perfluoroalkanes, three of which are described. 1,2-Bis-(p-(ethoxydimethylsilyl)-phenyl)-tetrafluoroethane and 1-(p-(ethoxydimethylsilyl)-phenyl)-3-(m-(ethoxydimethylsilyl)-phenyl)-hexafluoropropane, prepared from the corresponding bis-bromophenyl compounds, were homopolymerized. The former monomer yielded a solid homopolymer, but it could be copolymerized with diethoxydimethylsilane to form a more suitable gum. The latter monomer gave a homopolymeric gum. This polymer, upon heating in a vacuum, depolymerized, forming an unusual monomeric cyclic disiloxane. The synthesis of 1,3-bis(p-(ethoxydimethylsilyl)-phenyl)-hexafluoropropane from the third bis-(bromophenyl)-perfluoroalkane was unsuccessful on a preparative scale. (Author)

AD-275 710 Div. 4, 14
(TISTM/EJH) OTS price $1.50

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DILUTE SOLUTION PROPERTIES OF POLY (N-OCTYL METHACRYLATE). II,
by Victor J. Gongola, Salvatore S. Stivala, and David W. Levi. June 62, 59p. incl. illus. tables, 5 refs. (Technical rept. no. FRL TR 63)
(DA Proj. 599-25-001)
Unclassified report

DESCRIPTORS: *Polymer solutions, *Polymers, *Acrylic resins, Organic solvents, Butanols, Molecular weight, Viscosity, Optics, Light, Scattering, Tables.

Phase separation studies were carried out to find another theta solvent for poly(n-octyl methacrylate). Isobutyl alcohol at 19.7 C was found satisfactory for this purpose. This polymer, under unperturbed conditions, is more extended than poly(2-ethylbutyl methacrylate). However, the degree of chain extension is still less than that of poly(n-hexyl methacrylate). Comparison of light scattering results from dissymmetry obtained in previous work with those obtained from more complete angular studies confirms the earlier results, with rather minor exceptions. However, dimensions obtained from the Zimm plots are considerably greater than those from dissymmetry. This work gives some indication that the fractions are not very homogeneous with respect to molecular weight. (Author)

AD-275 728 Div. 4, 25
(TISTM/REB) OTS price $12.00

Air Products and Chemicals, Inc., Allentown, Pa.
THERMODYNAMIC DATA ON OXYGEN AND NITROGEN.
Rept. for May-Sep 61, on Aviation Fuels,
by Jerome Brewer. Sep 61, 151p. incl. illus. tables, 239 refs.
(Contract AF 33(616)8287, Proj. 1(1-3048))
(ASD TR 61-625) Unclassified report

DESCRIPTORS: *Oxygen, *Nitrogen, *Air, Mixtures, Thermodynamics, Thermal conductivity, Phase studies, Viscosity, *Liquefied gases, Density, *Bibliography, Temperature, Fluids.

The following data, which were compiled from published literature, are presented graphically as a function of temperature and pressure:

viscosity of N, O, air, saturated liquid, (O, N, and mixtures), vapor-liquid equilibrium ratios: O-N system, dew points: O-N system, bubble points: O-N system, thermal conductivity of N, O, saturated liquefied N, and O, density of O, N, Prandtl number of N, and O. For each of the above properties a discussion of their critical evaluation was made. Two complete sets of curves were presented, one set with experimental and correlative data points and one set without data points. A complete bibliography of the sources used for each property is given as well as a master bibliography which include all sources consulted or related to the subject. Tables of tabulated values of the properties used to construct the various graphs are presented. (Author)

AD-275 784 Div. 4
(TISTM/REB) OTS price $2.60

National Engineering Science Co., Pasadena, Calif.
RESEARCH AND DEVELOPMENT TO SYNTHESIZE AND ISOLATE LESSER OR UNKNOWN BORANES.
Final rept.,
by J. F. Ditter, H. E. Landesman, and R. E. Williams. 31 Dec 61, 27p. incl. illus. tables, 15 refs.
(Contract AF 04(611)5156)
Unclassified report

DESCRIPTORS: *Boron compounds, *Hydrides, *Decaboranes, Synthesis, Separation, Crystallization, Vapors, Chromatographic analysis, Nuclear magnetic resonance, Molecular structure.

Attempts were made to prepare, isolate and characterize higher molecular weight boranes between hexaborane-10 and decaborane-14. Conglomerate mixtures of these species were prepared as by-products in the high voltage discharge of diborane, then concentrated by vacuum fractionation, which removed major portions of the more volatile compounds (tetraborane and pentaborane). An investigation was made of separation techniques such as fractional crystallization, vapor chromatography and vacuum flashing. An NMR spectrum that appears to be due predominantly to octaborane (but possibly also nonaborane) was obtained, and a tentative structure has been inferred. Mass spectra corresponding to the parent ion fragments of heptaborane and nonaborane are given. The nonaborane spectrum undoubtedly is that of B9H15, while that of heptaborane is perhaps B7H17, since unstable boranes generally cut off below the mass number of the parent compound. A plausible structure of heptaborane is illustrated. A general discussion of the application of NMR to boranes and derivatives is included. (Author)

AD-275 807 Div. 4, 25
(TISTM/EJH) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
OSMOMETRY OF HIGH POLYMER SOLUTIONS,
by Hsueh T. Lee, Richard J. Valles, and David W. Levi. June 62, 24p. incl. illus. tables, 9 refs.
(Technical rept. no. FRL TR 67)
(Proj. 599-25-001)
Unclassified report

DESCRIPTORS: *Polymer solutions, *Polymers, Methyl radicals, *Acrylic resins, *Osmotic pressure, Viscosity, Molecular weight, Physical chemistry, Alkyl radicals.

Osmotic pressure measurements on three alkyl methacrylate polymers are described. These include an unfractionated poly(n-docosyl methacrylate) and samples of fractionated poly(n-lauryl methacrylate) and poly(2-ethylbutyl methacrylate). Weight average/number average molecular wt. ratios ranged from about 10 for the unfractionated material to 1.5 - 2 for the fractionated samples. Osmotic second virial coefficients were obtained. From experimental M sub w and M sub n values, viscosity average molecular weights were estimated. Relations between viscosity and the various types of average molecular weights are described and discussed. (Author)

AD-275 808 Div. 4
(TISTM/EJH) OTS price $1.60

Southampton U. (Gt. Brit.).
NITROGEN-CONTAINING ORGANOMETALLICS OF MOLYBDENUM AND TUNGSTEN.
Final rept., 1 Apr 61-31 Mar 62,
by G. W. A. Fowles. 31 Mar 62, 14p. incl. tables.
(Contract DA 91-591-EUC-1733)
Unclassified report

DESCRIPTORS: *Metalorganic compounds, *Complex compounds, *Molybdenum compounds, *Tungsten compounds, Bromide, Chlorides, Ethyl radicals, Methyl radicals, Praseodymium compounds, Amines, Pyridines, Phenyl radicals, Phosphines, Synthesis, Chemical reactions, Valence, Chemical analysis, Infrared spectroscopy, Nitrogen.

This research falls into 2 categories: that concerned with the preparation and characterisation of suitable starting materials, and that dealing with the reactions of these materials with typical organometallic compounds. Mo compounds in the ter-, quadri-, and quinquevalent states, and quadrivalent W compounds were prepared. In the tervalent state, Mo formed compounds of the type MoX3,3L, with X = Cl and Br, and L = EtNH2, PrNH2 and Py. Reaction of MoBr3 with ethylene diamine gave the solid brown (Moen3)Br3. MoBr(NH2)2 was prepared by the reaction of MoBr3 with liquid NH3. Quadrivalent Mo and W compounds of the type MX4,2L were characterised. The coupling experiments carried out so far have been aimed at producing compounds containing either an M-C or M-P bond. In the M-C experiments, tervalent and quinquevalent Mo compounds were reacted with Li phenyl, Na cyclopentadienide, and n-propyl magnesium bromide. (Author)

AD-275 820 Div. 4
(TISTM/EJH) OTS price $6.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
(No title).
Technical rept. no. 7, 1 Sep 61-28 Feb 62. 28 Feb 62, 66p. incl. illus. tables, refs.
(Contract Nonr-269300, Proj. NR 356-407)
Unclassified report

DESCRIPTORS: *Polymers, Ethylenes, Oxides, Styrenes, Chlorides, Methyl radicals, Benzenes, Lithium compounds, Crystals, Crystal structure, Molecular weight, Physical properties, Viscosity, Mechanical properties, Molecular structure, Vibration, Elasticity, Synthesis, Polymerization, Instrumentation, Test equipment, Torsion meters, Theory, Metalorganic compounds.

This report includes:
THE FREE VIBRATION EXPERIMENT IN THE THEORY OF LINEAR VISCOELASTICITY, by Hershel Markovitz. 1962, 19p. incl. illus. table, 3 refs.

CALCULATIONS OF ENTANGLEMENT COUPLING SPACINGS IN LINEAR POLYMERS, by H. Markovitz, T. G: Fox, and J. D. Ferry. 1962, 8p. incl. table (In cooperation with Wisconsin U., Madison)

Contents:
Dimensions of polymer chains
Mechanical properties
  Construction of a forced oscillation torsion pendulum
  The free vibration experiment in the theory of lineary viscoelasticity
  Calculations of entanglement coupling spacings in linear polymers
The preparation and characterization of model branched polymers
  Preparation of cruciform coupling agents
  Preparation of tetrachain polymers
  Characterization of the structure of tetrachain star-type polystyrenes
Viscosity-molecular weight relations for model branched polymers

AD-275 877 Div. 4
(TISTM/EJH) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THERMAL DECOMPOSITION OF SILVER-COATED ALPHA LEAD AZIDE,
by Bruno Reitzner, J. V. Richard Kaufman, and Eugene F. Bartell. Apr 62, 18p. incl. illus. 7 refs. (Technical rept. no. FRL TR 65)
(Proj. 503-05-021)
Unclassified report

DESCRIPTORS: *Lead compounds, *Azides, Coatings, Silver, Catalysts, Catalysis, *Decomposition, Reaction kinetics, Temperature, Water vapor, Hydrazines, Hydrates, Cooling, Liquefied gases, Nitrogen.

The induction times of the thermolysis reaction $Pb(N_3)_2 = Pb + 3N_2$ can be reduced by coating $Pb(N_3)_2$ with metallic silver. This effect is attributed to the catalytic effect of the silver. The induction time of the slow thermolysis in vacuum at 240 C is substantially the same with 1.0 and 10.0 atom-% Ag. Water incorporated into the lead azide during the coating procedure reverses the effect of the silver, causing a poisoning of the autocatalytic reaction. Mass spectrometric analysis shows that the water undergoes a hydrolysis reaction with $Pb(N_3)_2$ whereby hydrogen azide is formed. A bridge propagation mechanism, assumed to occur in the later stages of the decomposition in the mass of crystals, explains some anomalies occurring with the silver-coated materials. (Author)

AD-275 885 Div. 4, 25
(TISTM/EJH) OTS price $1.60

California U., Los Angeles.
THERMAL DECOMPOSITION OF NITRYL CHLORIDE IN SHOCK WAVES,
by Hiroyuki Hiraoka and R. Hardwick. Oct 61, 10p. illus. tables, 23 refs.
(Contract AF 49(638)733, Proj. 9751)
(AFOSR TN 61-2; AFOSR-2544)
Unclassified report

DESCRIPTORS: *Nitrogen compounds, *Oxychlorides, *Decomposition, Shock waves, High temperature research, Argon, Oxygen, Controlled atmospheres, Reaction kinetics, Kinetic theory, Thermodynamics, Thermochemistry.

The thermal decomposition of NO_2Cl in Ar and in O_2 as well as that of pure NO_2Cl was studied from 600 to 1000 K at concentrations of 0.001 to 0.01 moles/liter using a shock wave technique. In general, the results are compatible with earlier, low temperature measurements. The activation energy for pure NO_2Cl decomposition is about 2.5 kcals/mole less than that for NO_2Cl + Ar or NO_2Cl + O_2. This is compared to the drop in activation energy calculated from the differences in energy transfer efficiency assuming deactivation on every collision. (Author)

5. COMMUNICATIONS

AD-275 480 Div. 5
(TISTE/NTM) OTS price $10.50

Office of Research Administration, U. of Michigan, Ann Arbor.
DIGITAL COMMUNICATION STUDIES. PART I. COMPARATIVE PROBABILITY OF ERROR AND CHANNEL CAPACITY. PART II. ASYNCHRONOUS TIME-MULTIPLEXING OF MULTICHANNEL SPEECH SOURCES,
by M. P. Ristenbatt, T. G. Birdsall and others. Mar 62, 128p. incl. illus. tables, 41 refs.
(Technical rept. no. 133; Rept. no. 4251-2-T)
(Contract DA 36-039-sc-87172)
Unclassified report

DESCRIPTORS: *Digital systems, *Communication systems, *Voice communication systems, *Data transmission systems, *Multiplex transmission, *Multichannel telephone systems, *Radio communication systems, Speech transmission, Coding, Modulation, Probability, Errors, Pulse modulation, Signal-to-noise ratio.

The theoretical advantages and disadvantages are presented of alternative modulation and coding methods for digital communications. White Gaussian noise with optimum receivers is assumed. The signals considered are: simplex, bi-orthogonal, coherent-orthogonal, incoherent-orthogonal, and M-phase. The probability of error and bandwidths for existing and contemplated signals of these types are compared. Both a constant and a variable data rate comparison are made. M-ary bi-orthogonal signals are deemed best for low S/N if probability of error is stringent. Binary and M-phase signals appear best for medium and large S/N. This treatment should help structure the selection of modulation and coding methods for proposed communication systems. Also, since many signalling methods are considered, some fundamental principles, terminology, and methods of comparing are suggested. An analytical evaluation is presented of asynchronous time-multiplexing for multichannel speech signals. This asynchronous system applies where a number of speech sources participate in a common channel, and it is proposed that the source-to-channel sample assignment be asynchronous. (Author)

AD-275 532 Div. 5, 8, 25, 15
(TISTP/MFA) OTS price $18.00

Space-General Corp., El Monte, Calif.
MODELING STUDIES. SUBSURFACE PROPAGATION.
Final technical rept.,
by A. F. Gangi, R. N. Ghose, and M. E. Louapre.
15 Mar 62, 265p. incl. illus. tables, refs.
(Rept. no. SGC 21R-10)
(Contract AF 30(602)2152, Proj. 4519)
(RADC TDR 62-127) Unclassified report

DESCRIPTORS: Feasibility studies, *Electromagnetic waves, *Propagation, Earth, Ionosphere, *Dipole antennas, Antenna radiation patterns, Communication systems, Waveguides, Dielectrics, Conductivity, Design, Instrumentation, Tests, Microwave equipment, Harmonic analysis, Potential theory, Integral transforms, Partial differential equations.

This rept. includes:
FIELDS FROM A BURIED HORIZONTAL DIPOLE IN A FLAT EARTH - FLAT IONOSPHERE SYSTEM, by A. F. Gangi. Mar 62 (Rept. no. SGC TM 1-10)

The theory of electromagnetic wave propagation in a flat earth-ionosphere system from above-surface and subsurface antennas is discussed. Calculated results obtained from a digital computer are compared with experimental results obtained from a scaled model of the earth-ionosphere system. The experimental results were obtained from two scale models, one a flat earth-ionosphere model and the other a spherical earth-ionosphere model. Scale factors of the order of one million were used in the propagation models. The properties of subsurface antennas and antenna arrays were investigated using modeling techniques. The experimental results were compared with theoretical results. Criteria for the design of subsurface antenna arrays were obtained. A description of the instrumentation used in the antenna characteristics measurements and in the propagation models is given. Recommendations for future research and developments are also presented. (Author)

AD-275 558 Div. 5, 25
(TISTE/CDM) OTS price $4.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
PROPOSED METHODS FOR THE CALCULATION OF THE ARTICULATION INDEX,
by K. D. Kryter. Oct 61, 20p. illus. tables, 19 refs. (Rept. no. 906)
(Contract AF 19(604)4061)
(ESD TDR 62-35) Unclassified report

DESCRIPTORS: *Speech transmission, *Indexes, *Speech, *Intelligibility, *Voice communication systems, Test methods, Measurement, Standards.

The most valid and generally accepted procedure for measuring the ability of a communication system to transmit intelligible speech is to subject the system to a series of so-called speech intelligibility tests. However, speech intelligibility is expensive, time consuming, and requires laboratory test conditions. In an attempt to short-cut or make unnecessary this type of testing, a procedure was developed for calculating from physical and acoustical measurements made on a communication system a measure that is indicative of the intelligibility scores that would be obtained for that system under actual test conditions. This measure is called the Articulation Index (AI). Methods of calculating AI were improved and developed to the point where standard methods for its calculation can be proposed for use in the military and industry. The procedures presented should be of benefit to communications engineers responsible for the design and operation of speech communication systems. (Author)

AD-275 586 Div. 5, 8
(TISTP/JW) OTS price $4.60

Motorola, Inc., Chicago, Ill.
DATA TRANSMISSION INVESTIGATION.
Quarterly progress rept. no. 2, 11 Dec 61-10 Mar 62,
by J. J. Tsimbidis. 10 Mar 62, 44p. incl. illus. table (Rept. no. 2)
(Contract DA 36-039-sc-87343, Proj. 3B31-01-001)
Unclassified report

DESCRIPTORS: *Data transmission systems, *Errors, Digital systems, Measurement, Test equipment, Failure (Mechanics), Noise, Communication systems, *Military communications, Radio communication systems, Information theory, Power supplies, Circuits, Transmission lines, Tests.

Error detecting and logging equipment was constructed and tested for reliable operation. Modifications were made to reduce the susceptibility to transients and noise and self-check circuits were added. The Serial Data Correlator was modified and mated with the logging equipment. The AN/TCC-7 system was rehabilitated to provide a reliable communications link for the field tests. Channel characteristics of the AN/TCC-7 system with 80 miles of cable were measured. Comparison of the characteristics of a system connected back-to-back without a cable shows that the cable has little effect on the characteristics. The input level to the AN/TCC-7 system was reduced from -5dbm to -7dbm to reduce the effects of cross-talk between adjacent channels. A power line voltage recorder was added to the test equipment to determine the effect of power line variations and transients. (Author)

AD-275 591 Div. 5, 25
(TISTB/LH) OTS price $1.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
OPTICAL COMMUNICATIONS: A BIBLIOGRAPHIC SURVEY OF POSSIBLE SPACE AND TERRESTRIAL APPLICATIONS OF THE LASER AND MASER,
comp. by Jack B. Goldmann. Mar 62, 54p. 157 refs.
(Special bibliography no. SB-62-7; Rept. no. 3-77-62-4)
(Contract AF 04(647)787)
Unclassified report

DESCRIPTORS: *Bibliography, Communications theory, *Light communication systems, Lasers, Masers, Space environmental conditions.

This annotated bibliography includes publications released from 1959 through February 1962. The survey contains references to the solid state and gaseous areas of investigation which have been made with regards to the application of masers and lasers to optical communications. (Author)

AD-275 622 Div. 5
(TISTE/CAM) OTS price $9.10

Radiation, Inc., Melbourne, Fla.
EXPERIMENTAL INVESTIGATION OF CHAFF TRANSMISSION IN THE 1300 TO 1800 MC FREQUENCY RANGE.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 62, by L. H. Bauer. 31 Mar 62, 1v. incl illus.
(Contract DA 36-039-sc-88897)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Secret communication systems, *Radar confusion reflectors, *Radio relay systems, *Radio transmission, Ultra high frequency, Radio signals, Radio waves, Propagation, Attenuation, Scattering, Polarization, Reflectors, Reflection, Reliability, Measurement, Design, Tests.

Effort was continued on determining the feasibility of communicating from one point on the earth to another below the horizon via chaff clouds. Data are presented on the behavior of bistatic cross section of the chaff cloud, the effects of polarization, the probability distribution of received signal power and the spectra of fading frequencies. The bistatic cross section for 3.75 (10 to the 6th power) dipoles was 1500 to 2500 square meters with an average value of approximately 2000 square meters. One drop for which polarization measurements were made produced a 3 db difference for 90 degrees rotation of the receiving antenna (transmitting antenna fixed). The probability distribution of received power was essentially Rayleigh. The spectrum of fading frequencies for six samples was 0 to 5 c. (Author)

6. DETECTION

AD-275 364 Div. 6, 30
(TISTW/DLW) OTS price $1.75

Army Ordnance Missile Command, Redstone Arsenal, Huntsville, Ala.
A DISCUSSION OF SIGNAL AND NOISE ELECTRONIC SIMULATION EQUIPMENTS FOR INFRARED SIGNAL PROCESSING CIRCUITRY DESIGN AND DEVELOPMENT,
by C. R. Seashore. 27 Apr 62, 60p. incl. illus. tables, 8 refs. (Rept. no. RE-TR-62-1)
Unclassified report

DESCRIPTORS: *Infrared radiation, *Signal generators, *Waveform generators, *Infrared pulses, *Interference, *Data processing systems, *Infrared detectors, Simulation, Infrared equipment, Signal-to-noise ratio, Electronic circuits, Test equipment, Theory, Amplitude modulation, Design, Discriminators.

A method of deriving electronic simulated signal and noise voltages for experimental development of infrared signal processing circuitry is described. An amplitude-modulated signal generator is designed and combined with a commercial random noise generator to form one type of input forcing function. Analytical treatment of sine wave and square wave carriers modulated by a sine wave plus Gaussian noise is included. A photoconductive infrared detector (PbS) is considered in its appropriate bias circuit with signal and noise responses as functions of bias current and chopping frequency included. Pertinent infrared detector theory and terminology are given on the subject of photoconductive detectors. A phase-locked FM discriminator block diagram is shown which may be tested and analyzed, with certain linearizing approximations, when the electronic simulator delivers frequency-modulated error signal plus Gaussian noise information to the signal processing electronics. (Author)

AD-275 380 Div. 6, 3
(TISTB/AW) OTS price $3.60

Beckman Instruments, Inc., Fullerton, Calif.
CHEMICAL WARFARE DETECTION AND WARNING SYSTEM.
Rept. for 11 Aug-22 Dec 61 on CW Detection and Warning Equipment,
by James G. Myers. Mar 62, 32p. incl. illus.
(Contract AF 33(616)8380, Proj. 6338)
(ASD TR 61-710) Unclassified report

DESCRIPTORS: *Infrared detectors, Infrared equipment, Infrared optical systems, Chemical warfare agents, Detection, *Toxic agent alarms, Blackbody radiation, Absorption, Gases, Analysis, Measurement, Selection.

The basic requirements of Long Path Infrared (LOPAIR) systems for detecting and warning of the presence of chemical warfare (CW) agents are discussed. Several varieties of active LOPAIR systems together with their advantages and disadvantages are reviewed. A simplified version of a non-dispersive infrared analyzer which employs a monobeam pneumatic selective detector is described. Results of some successful preliminary tests performed at George Air Force Base, California are discussed. The tests which were over ranges of 4,350 feet and 10,825 feet (0.824 and 2.05 statute miles) were made in the presence of atmospheric scintillation and through the exhaust trails of various aircraft. Successful operation through scintillation is essential to LOPAIR systems. Previous tests on other LOPAIR systems showed them to be adversely affected by scintillation. Conclusions on the use of Narrow Absorption Infrared (NAIR) systems are given. Recommendations and conclusions, and possible test procedures for an active LOPAIR system of the monobeam NAIR type are given. (Author)

AD-275 425 Div. 6, 14, 30
(TISTM/REB) OTS price $2.60

Emerson and Cuming, Inc., Canton, Mass.
STUDY OF RADAR ABSORBER MATERIALS.
Engineering rept. no. 9, 1 Jan-31 Mar 62.
31 Mar 62, 11p. incl. illus. table.
(Contract AF 33(616)7047, Proj. 5546)
Unclassified report

DESCRIPTORS: *Interferometers, Measurement, *Dielectric properties, *Dielectrics, *Anti-radar coatings, Composite materials, Spheres, Expanded plastics, Electrometers, X-band, Microwaves, Absorption.

A microwave interferometer apparatus was used for precision measuring of insertion loss and insertion phase in X-band. Calculations for conversion of the insertion loss and phase data to dielectric constant and loss tangent were made for 1/4-, 3/8-, and 1/2-in.- thick samples of lossy dielectric materials. A typical graph for conversion of the computed data on 3/8 in.- thick samples up to dielectric constant of 5.0 is included and an initial correlation of the interferometer results with those obtained on a microwave dielectrometer is given. (Author)

AD-275 486 Div. 6, 8, 12
(TISTW/DLW) OTS price $3.60

Naval Research Lab., Washington, D. C.
A PHASE-CHANNEL COMBINER FOR THE NRL SPACE SURVEILLANCE SYSTEM,
by M. G. Kaufman. 23 Apr 62, 28p. incl. illus. table, refs. (NRL rept. no. 5728)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Radio interferometers, *Angle of arrival, *Phase measurement, *Waveform generators, *Data processing systems, Detecting, Tracking, Radio receivers, Radio signals, Identification, Position finding, Electromagnetic wave reflections.

The Space Surveillance System developed at NRL for the detection of earth satellites forms a fence across the southern part of the US. Four receiving sites are altered with three transmitting sites which illuminate satellites with radio energy as they traverse the fence. The angle of arrival of the reflected signals is measured at each receiving station by a compound radio interferometer. Automation in the detection process is needed to facilitate identification and sorting of satellites from each other (and from refuse), if a large backlog of data is to be avoided. An electronic system was developed which automatically combines the phase channels into one unambiguous channel and depicts the angles of arrival of the radio energy from the satellites. The basic technique used in the phase-channel combiner is described. By use of the phase-channel combiner, the necessary complexity in the multi-antenna radio-interferometer detection system is not passed on to the data processing system. (Author)

AD-275 612 Div. 6, 2
(TISTW/DLW) OTS price $10.10

National Co., Inc., Malden, Mass.
SUGGESTIONS FOR THE ADAPTATION OF THE PORCUPINE II B RADAR FOR THE DETECTION OF SMALL ATMOSPHERIC DIELECTRIC IRREGULARITIES.
Final rept., 1 Apr 61-31 Jan 62,
by Richard H. T. Bates. 30 Apr 62, 118p. incl. illus. refs.
(Contract AF 19(604)8340, Proj. 6682)
(AFCRL 62-234) Unclassified report

DESCRIPTORS: *Doppler radar, *Meteorological radar, Turbulence, Atmosphere, Dielectric properties, Wind, Velocity, Radar pulses, Phase measurement, Coding, Scattering, Detection, Feasibility studies.

The radar measurement of clear-air dielectric irregularities is examined. It is concluded that a pulsed Doppler radar is the most satisfactory type. It is shown that range ambiguities can conveniently be reduced through pulse phase coding. The type of apparatus considered suitable for the detection of clear-air irregularities is shown to be a sound basis for a general purpose weather radar. (Author)

AD-275 774 Div. 6, 28
(TISTB/AW) OTS price $5.60

Dynamic Analysis and Control Lab., Mass. Inst. of Tech., Cambridge.
TIME-VARYING CHARACTERISTICS OF THE HUMAN OPERATOR IN AN OPEN LOOP,
by Pierre R. Belanger. 30 Mar 62, 51p. incl. illus. tables, 6 refs. (Rept. no. 8055-4)
(Contract AF 19(604)4548)
(ESD TDR 62-31) Unclassified report

DESCRIPTORS: *Tracking, *Control systems, Man, Time, Control, Measurement, Feedback, Linear systems, Nonlinear systems, Integration, Integral transforms, Statistical functions.

This study utilizes the classical theory of time-varying networks, due to Zadeh, to describe randomly time-varying characteristics of the human operator of a control system. The method is applied to the performance of the human operator in tracking tasks without visual feedback. The human is required to track a random appearing target which is displaced as the sum of five non-harmonic sinusoids. The human's transfer function varied randomly in time. The average open-loop characteristics show that with no dynamics in cascade with the human, the latter has more difficulty remembering the proper gain than the proper phase which he must apply in order to track accurately. When dynamics are introduced, it is seen that the human tends to forget the effects that the dynamics produced when tracking with feedback. (Author)

AD-275 810 Div. 6, 25
(TISTW/RD) OTS price $4.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
INFRARED TARGET AND BACKGROUND RADIOMETRIC MEASUREMENTS. CONCEPTS, UNITS, AND TECHNIQUES.
Jan 62, 43p. incl. illus. table, 15 refs.
(Rept. no. 2389-64-T)
(Contract Nonr-122412)
(NAVEXOS P-2406) Unclassified report

DESCRIPTORS: *Thermal targets, *Infrared radiation, Radiometers, Calibration.

Contents:
Interpretation of target and background
Radiometric units and concepts
Source characteristics affecting instrument choice
General attributes of radiometric instruments
Calibration of a radiometer
Data presentation

7. ELECTRICAL EQUIPMENT

AD-275 363 Div. 7, 25, 22
(TISTP/WH) OTS price $5.60

Armour Research Foundation, Chicago, Ill.
TWO-CONDUCTOR ELECTRICAL TRANSMISSION LINE THEORY.
Quarterly rept. no. 3,
by H. G. Tobin. 25 Mar 62, 50p. incl. illus. tables, 9 refs. (Rept. no. ARF 5167-Q3)
(Contract N178-7927)
Unclassified report

DESCRIPTORS: *Electric igniters, *Transmission lines, Audiofrequency cables, *Low pass filters, Attenuation, Design.

Attenuation measurements were performed upon transmission lines which were designed to act as low pass filters. It is desired that the lines pass audio firing signals to an electric initiator while acting as an attenuator to high

frequency energy which may be picked up from shipboard equipments. Extensive measurements have been performed upon an RC line, a two-layer, several lumped element line, and a line which utilizes skin effect to increase its high frequency attenuation. The measurements indicate that only the RC line has been fabricated to the design criteria which had been previously derived. Difficulties in the fabrication procedure did not allow the theoretical characteristics of either the two-layer line or the skin effect line to be achieved. Difficulty in fabricating an RC line in a coaxial configuration while still maintaining the desired attenuation characteristics has led to a study of an LG line (L, inductance per unit length; G, conductance per unit length). (Author)

AD-275 371 Div. 7, 8, 1
(TISTA/VGW) OTS price $4.00

Marquardt Corp., Van Nuys, Calif.
STUDY OF ADVANCED FLIGHT VEHICLE POWER SYSTEMS. VOLUME I - ANALYTICAL STUDY.
Rept. for July 60-June 61,
by Paul Brock, Bansun Chang and others. Jan 62, 254p. incl. illus. tables, 7 refs.
(Contract AF 33(616)7496, Proj. 8128)
(ASD TR 61-368, vol. 1)
Unclassified report

DESCRIPTORS: *Auxiliary power plants, Feasibility studies, High altitude, Space flight, Research planes, Satellite vehicle research, *Electric power production, Hydraulic power systems, Pneumatic systems, *Electrical networks, Direct current, Alternating current, Electrical equipment, Microwave networks, Optical systems, *Transmission lines, Waveguides, *Power supplies, Acoustic waveguides, Pulse transmitters, Wave transmission, Effectiveness, Satellite vehicles.

Results of a study of a variety of advanced flight vehicle auxiliary power systems are presented. This study involved an investigation of combinations of energy sources, conversion schemes, transmission techniques, and utilization devices. A morphological analysis was conducted in which energy sources, converters, transmission links, and utilization devices were examined for possible combination into new and attractive power systems. This approach resulted in a number of potential combinations. Each system considered was optimized for minimum weight over a range of power levels and transmission distances. Following this optimization, the systems were compared on the basis of feasibility, weight, reliability, efficiency, flexibility, economy, complexity, and capacity. The results revealed that those power systems which incorporate the conventional methods of power transmission will produce minimum total system weight when the source energy is available in conventional, electrical or mechanical form. (Author)

AD-275 404 Div. 7, 25
(TISTE/CDM) OTS price $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ELECTROHYDRODYNAMIC POWER GENERATION - EXPERIMENTAL STUDIES,
by John M. Smith and W. Fried. Mar 62, 14p. incl. illus., 3 refs. (TIS rept. no. R62SD27)
(Contract AF 33(616)7539)
Unclassified report

DESCRIPTORS: *Electric power production, *Magnetohydrodynamics, *Gas ionization, *Plasma physics, Tests, Theory, Electrical corona, Van de Graff generators, Feasibility studies, Gas discharges, Generators.

A series of experiments was performed to establish the feasibility of generating electrical power by means of a generator based upon the principle of the Van de Graff generator, the primary difference being that the charge is transported in a moving gas rather than on a moving belt. The experiments were performed using a corona ionization source and showed that a net electrical output could be obtained; thereby, establishing the feasibility of such a generator. (Author)

AD-275 516 Div. 7
(TISTP/JW) OTS price $4.60

Republic Aviation Corp., Farmingdale, N. Y.
THERMIONIC AC GENERATION,
by C. L. Eisen and A. Schock. 15 Mar 62, 44p. incl. illus. 5 refs. (Technical rept. no. 2)
(Contract Nonr-328500, Proj. NR 099-350)
Unclassified report

DESCRIPTORS: *Thermionic emission, *Generators, *Voltage, Alternating current, Direct current, Transformers, Anodes, Cathodes.

A system for modulating the output of a thermionic generator and delivering a high voltage alternating current to the load is presented. After optimizing the mode of operation, equations for the maximum conversion efficiency are derived. For a given anode work function and cathode temperature, it is shown that the maximum ac efficiency is equal to approximately 70% of the corresponding dc value. An illustrative example, including a proposed design for a rather unconventional transformer, is appended. (Author)

AD-275 524 Div. 7
(TISTM/BRW) OTS price $3.60

Radio Corp. of America, Somerville, N. J.
EVALUATION OF NEW CATHODE-ANODE COUPLES FOR SECONDARY BATTERIES.
Quarterly technical progress rept. no. 2, 1 Feb-30 Apr 62,
by E. F. Uhler, D. Fields, and G. S. Lozier. 30 Apr 62, 29p. incl. illus. tables, 2 refs.
(Contract AF 33(657)7758, Proj. 3145 (Continuation of Contract AF 33(616)7505))
Unclassified report

DESCRIPTORS: *Storage batteries, *Cathodes (Electrolytic cell), *Anodes (Electrolytic cell), Electrolytes, Fluorides, Chlorides, Alkali metals, Alkaline earth metals, Aluminum, Lithium, Magnesium, Nickel, Silver, Platinum, Battery separators, Ceramic materials, Glass seals, Metallic compounds, Lithium compounds, Magnesium compounds, Nickel compounds, Silver compounds, Design, Battery compartments.

This report presents a general approach to the selection of possible electrode combinations to provide secondary cells using molten-salt electrolytes and ceramic materials for separators and packaging of the cells. Experimental results are presented for molten salt cells using chloride and fluoride electrolytes in the following couples: Li . AgCl/Ag, Mg . NiCl2/Ni, Al . Ni Cl2/Ni, and Al . AgCl/Ag. (Author)

AD-275 546 Div. 7, 8, 1
(TISTA/VGW) OTS price $2.75

Marquardt Corp., Van Nuys, Calif.
STUDY OF ADVANCED FLIGHT VEHICLE POWER SYSTEMS. VOLUME II. VIBRATORY POWER TRANSMISSION.
Rept. for July 60-June 61.
Jan 62, 121p. incl. illus. table, 12 refs.
(Contract AF 33(616)7496, Proj. 8128)
(ASD TR 61-368, vol. 2)
Unclassified report

DESCRIPTORS: *Auxiliary power plants, Feasibility studies, High altitude, Space flight, Research planes, Satellite vehicle research, Satellite vehicles, *Electric power production, Direct current, Alternating current, Analog systems, *Transmission lines, Pneumatic systems, Vibration mechanisms, Pulse transmission, Wave transmitters, Wire, Steel wire, Effectiveness, Acoustics, Vibration, Power, Transmission.

Results of analytical and experimental investigations of the feasibility of power transmission by acoustic or vibratory mechanical energy are presented. The transmission of oscillatory energy is not characterized by the steady flow of fluids or rotation of shafts but instead effects the transfer of energy by the transmission of alternating pressure or stress waves through fluids or solids. Analogies are drawn between electromagnetic waves covering the frequency range from direct electric currents to microwave frequencies and the equivalent frequency domains in mechanical wave propagation. The problems involved and the characteristics of vibratory power transmission are shown to be equivalent to those encountered for conventional low and high frequency electrical systems. This investigation, in conjunction with the information presented in Volume I, (AD-275 371) reveals that the transmission of vibratory energy through solids appears most promising since it possesses some advantages over more conventional means of transmission. (Author)

AD-275 732 Div. 7
(TISTE/CDM) OTS price $6.60

Brew, Richard D., and Co., Inc., Concord, N. H.
HIGH POWER PULSE CABLE ASSEMBLIES.
Final rept., 25 Feb 60-31 Jan 62,
by Russell F. Brown. 31 Jan 62, 59p. illus. tables.
(Contract DA 36-039-sc-85288)
Unclassified report

DESCRIPTORS: *Pulse cables, *Radiofrequency cables, *Electric cables, *Electric connectors, *Electric terminals, Design, Tests, Electrical corona, Materials, Manufacturing methods, Production, Test equipment, Dies.

Research was conducted on the optimum design of the high power pulse cable connector assemblies for cables RG-191/U and RG-192/U. A previous design was studied to determine methods of improving the electrical characteristics while simplifying the construction and reducing the weight and costs of these assemblies. A design layout and detailing of the component parts were prepared for the manufacture of experimental models. New materials, design of molds, dies, and fixtures were selected to simplify the assembly and speed production of mechanical parts. Special equipment was chosen for testing experimental models, assembling and testing of first experimental models, subsequent minor design changes, and compiling and evaluating of test results from the experimental assemblies. (Author)

AD-275 783 Div. 7
(TISTE/NTM) OTS price $10.10

PneumoDynamics Corp., Bethesda, Md.
TESTS OF A CONDUCTING-CARRIER-TYPE ELECTROSTATIC GENERATOR,
by D. C. Pauli and J. A. Rebman. Jan 62, 122p. incl. illus. tables (Technical rept. no. 6636-1)
(Contract AF 33(616)7537)
Unclassified report

DESCRIPTORS: *Electrostatic generators, *Power supplies, Electric power production, Space flight, Dielectrics, Sulfur compounds, Fluorides, Hydrogen, Nitrogen, Carbon dioxide, Pressure, Voltage, Vacuum apparatus, Test equipment, Test methods.

Tests were conducted on a small, 1 to 5 watt, conducting carrier type of electrostatic generator. The generator was operated in H2, N2, CO2, and SF6, from 0 to 200 psig; and in air, from 2 x 10 to the -6 power mm Hg to 200 psig. The maximum power output from the conducting carrier electrostatic generator was 6 watts and was obtained while operating the machine in a vacuum. The machine generated a maximum of 4 watts in pressure tests using sulfur hexafluoride as the dielectric at 150 psig. Peak output voltage (76 kv) was with 150 psig SF6 as the dielectric. In vacuum at 2 x 10 to the -6 power mm Hg, 35 kv output was obtained. Endurance tests conducted in SF6 under 150 psig pressure indicated that dust particles, produced by commutation, induced erratic behavior. (Author)

AD-275 792 Div. 7, 12, 26
(TISTE/CDM) OTS price $6.60

Union Carbide Consumer Products Co., Cleveland, Ohio.
HIGH VOLTAGE, GAS ACTIVATED BATTERIES.
Final rept., 9 Nov 59-31 Mar 61,
by William H. Deierhoi, Jr. 31 Mar 61, 58p. incl. illus. tables.
(Contract DA 36-039-sc-74856)
Unclassified report

DESCRIPTORS: *Primary batteries, *Guided missile batteries, *Manufacturing methods, *Electric power production, *Wet cells, Silver electrodes, Zinc electrodes, Silver compounds, Oxides, Electrolytes, Potassium compounds, Hydroxides, Release mechanisms, Gas generating systems, Heaters, Thermostats, Tests, Design, Voltage.

Design and fabrication was undertaken of a gas activated reserve Ag2O/Zn battery to operate between 24.5 and 27 v. on a one ohm load for 80 sec. with a voltage regulation of not more than one volt. Electric heater mechanism to operate from -40 C. was provided. The activating mechanism was a gas generator initiated by electric pulse to provide full battery output power in 1/2 sec. Data shows that the electrical output requirements are readily provided by an easily manufacturable 19-cell Ag2O dendritic zinc duplex electrode system as built into the end item. The major problem encountered was in achieving a uniform fill of KOH electrolyte into the 0.049 in. thick cells of the active battery stack. Funds expired before a reliable fill mechanism was proven. Sufficient additional improvements to the fill mechanism were made to indicate that it is possible to meet the technical requirements. (Author)

AD-275 803 Div. 7, 25
(TISTP/WH) OTS price $2.60

AVCO Everett Research Lab., Mass.
A REVIEW OF RECENT MHD GENERATOR WORK AT THE AVCO-EVERETT RESEARCH LABORATORY,
by T. R. Brogan, J. F. Louis and others. Mar 62, 20p. incl. illus. 4 refs. (Rept. no. AMP 74)
(Contract AF 49(638)1129)
(AFOSR-2352) Unclassified report

Presented at the Third Symposium on the Engineering Aspects of Magnetohydrodynamics, Rochester, New York, March 28, 1962.

DESCRIPTORS: *Magnetohydrodynamics, *Generators, Fluid mechanics, Gases, Electrical properties, Hall effect.

Conceptual plant design, electrical properties of gases, generator fluid mechanics and performance, field coil designs, and long duration testing are reviewed. In the area of gas properties, the experimentally determined conductivity of seeded combustion products is in good agreement with predicted values in the temperature range between 2300 to 3000 K. The study of generator fluid mechanics continued using the Mark II combustion generator. Successful operation at Hall coefficients up to two was achieved. Actual performance of the Mark II generator is discussed. The discovery of high field strength superconducting alloys has important implications for MHD power generation, as well as for many other MHD devices. There is a brief description of these coils as applied to MHD generators, together with an assessment of the economic possibilities they present for use in a power plant. (Author)

AD-275 899 Div. 7, 4
(TISTM/TCG) OTS price $.50

Politecnico di Milano (Italy).
RESEARCHES ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTALS. ANTIMONY.
Technical note no. 7, 1 July-30 Sep 61, on Surface and Interface Phenomena of Matter,
by L. Peraldo Bicelli and A. La Vechhia. Mar 62, 11p. incl. illus. table, 14 refs.
(Contract AF 61(052)144, Proj. 7022)
(ASD TN 61-157) Unclassified report

DESCRIPTORS: *Antimony, *Metallic crystals, *Single crystals, Electrodes, Electrochemistry, Hydrogen, Voltage, Perchloric acid, Electrolytes, Electrolytic cells, Cathodes (Electrolytic cell), Polarization, Crystals.

Hydrogen overvoltage on antimony polycrystalline and single crystal cathodes, oriented following the (100), (110), and (111) planes, has been investigated in 0.1 M $HClO_4$ solutions, in a c. d. range up to 100 amp/sq m. The Tafel law holds true at high c. d. values; the parameters being slightly different for the different electrodes. In the lower c. d. range, oscillographic recordings revealed the behavior is anomalous and different from that observed with other metals. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-275 353 Div. 8
(TISTP/WH) OTS price $5.60

Tennessee U. Engineering Experiment Station, Knoxville.
ELECTRONIC SCANNING OF CIRCULAR LOOP ARRAYS,
by D. R. Stephens, E. J. Kennedy, and H. P. Neff, Jr. 1 Mar 62, 53p. incl. illus. 6 refs.
(Scientific rept. no. 1)
(Contract AF 19(628)288, Proj. 4600)
(AFCRL 62-181) Unclassified report

DESCRIPTORS: *Loop antennas, Antenna radiation patterns, Electronic scanners.

An analysis is presented of concentric circular loop antenna arrays. The configuration which is considered consists of a number of concentric loop antennas with circumferences which are an integral number of wavelengths. These loop antennas provide radiation patterns whose principal terms are cos n, cos 2n, cos 3n, and cos kn in general. If an additional radiator is used to provide a non-directional pattern with respect to azimuth angle, n, then a radiation pattern of the form of a Fourier series may be obtained. The usual method is to utilize the Tchebyscheff polynomials to determine the Fourier coefficients. In this manner an optimum radiation pattern is achieved. To approximate the required current distributions, some form of circular symmetry is indicated for the generator or diving system. The antenna itself obviously possesses circular symmetry. Thus by proper electronic permutation of the drive system a complete 360 degree azimuthal scanned antenna array is possible. It is the purpose of this report to investigate these effects both theoretically and experimentally. (Author)

AD-275 374 Div. 8, 5, 30
(TISTE/CDM) OTS price $14.50

Armour Research Foundation, Chicago, Ill.
APPLICATION OF OPERATIONS RESEARCH TO INTERFERENCE,
by Frederick Bock and Bernhard Ebstein. Mar 62, 200p. incl. illus. tables, 16 refs. (Rept. no. ARF 5149-13)
(Contract AF 30(602)2375, Proj. 4540)
(RADC TDR 62-33) Unclassified report

DESCRIPTORS: *Radar interference, *Radio interference, *Radio communication systems, *Transmitter receivers, *Operations research, Radar equipment, Communication equipment, Scheduling, Probability, Combinatorial analysis, Mathematical prediction, Digital computers, Programming, Tests, Measurement.

The applicability of selected optimization and suboptimization methods of operations research to problems of radio and radar interference in congested electromagnetic environments was investigated. The controllable variables considered include transmitter power, tuned frequency of transmitters and receivers, and equipment location. The methods investigated include linear programming, network optimization techniques, dynamic programming, queuing theory, and certain restricted combinatorial search procedures. A digital computer program was written to predict interference. Various possible quantitative definitions of interference are discussed. A field test was carried out involving co-channel operation of two pairs of AN/GRC-27 communication transmitter-receivers with powers attenuated to the low levels calculated in the linear-programming approach. The results of the field test validate the use of the linear-programming model for power assignment. (Author)

AD-275 391 Div. 8
(TISTE/CAM) OTS price $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
AN IMPROVED SLOTTED WAVEGUIDE ANTENNA USING POST EXCITATION,
by Howard S. Jones, Jr. and Whilden G. Heinard. 23 Apr 62, 27p. incl. illus. 6 refs. (DOFL rept. no. TR-1029)
(Proj. DA-5N06-01.014)
Unclassified report

DESCRIPTORS: *Slot antennas, Waveguide slots, Coupled antennas, Waveguides, Waveguide irises, Theory, Design, Antenna radiation patterns, Standing wave ratios, Phase shifters, Lobing, Measurement, Tests, X band.

A slotted waveguide antenna with individual radiators excited by inductive posts is described. For comparison, the radiation patterns, VSWR, and bandwidth obtained in the design of similar types of arrays are discussed, including the iris and probe-excited slot arrays and the staggered slot variety. Comparison of performance characteristics shows that, for the post-excited slotted antenna design, side lobes were suppressed relatively well in all regions, VSWR characteristics were satisfactory over a reasonable bandwidth, construction provided certain mechanical advantages, and aperture illumination was adequately controlled. (Author)

AD-275 420 Div. 8, 26
(TISTE/NTM) OTS price $2.60

Bomac Labs., Inc., Beverly, Mass.
BL-221 70 Gc MAGNETRON PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 2, 6 Nov 61-6 Feb 62,
by Gary G. Riska. 6 Feb 62, 26p. incl. illus. tables.
(Contract DA 36-039-sc-85974)
Unclassified report

DESCRIPTORS: *Magnetrons, *Manufacturing methods, Anodes (Electron tubes), Electron tubes, Ceramic materials, Oscillation, Life expectancy, Tests, Production, Test methods, Design.

Research continued on the BL-221 70 Gc magnetron. Three additional tubes, one with vac-ion pump and two representing the standard design, were constructed and tested. Shelf life information on all tubes built to date was compiled and comparative life test evaluation under oscillation conditions was initiated. Progress was made on the ceramic window assembly, the construction of test equipment, and anode hobbing facilities. (Author)

AD-275 436 Div. 8
(TISTP/WH) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
M-ARY TRANSMISSIONS WITH LINEAR FILTERING ON RAYLEIGH FADING CIRCUITS,
by John N. Pierce. Mar 62, 13p. incl. table, 7 refs. (AFCRL 62-150)
(Proj. 4610)
Unclassified report

DESCRIPTORS: *Communications theory, Radio signals, *Pulse communication systems, Digital systems, Coding.

On a nonfading circuit, arbitrarily small error rates can be achieved by using uncoded M-ary transmissions with linear receiver filtering. Such a communication method can not yield arbitrarily small error rates on a Rayleigh fading circuit. Quantitative results indicate, in fact, that the improvement obtained in communicating binary data with M-ary transmissions is equivalent to a saving in transmitter power of less than 4.6 db. A somewhat greater improvement can be realized when M-ary alphabets are used to communicate from those data sources that display a natural M-ary structure--for example, teletype. Certain relations to coding, and the necessity of nonlinear filtering, are discussed. (Author)

AD-275 443 Div. 8
(TISTE/CAM) OTS price $7.60

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Quarterly progress rept. no. 4, 1 Feb-30 Apr 62, by F. S. Sawicki. 30 Apr 62, 69p. incl. illus. tables.
(Contract DA 36-039-sc-85953)
Unclassified report

DESCRIPTORS: *Electron tubes, *Manufacturing methods, Anodes (Electron tubes), Cathodes (Electron tubes), Seals, Coatings, Design, Processing, Electrical properties, Temperature, Humidity, Life expectancy, Tests.

Effort continued towards the evaluation of certain areas of advanced tube manufacturing techniques and their application where feasible to the JAN 6299 to result in a more reliable and better performing tube. Tubes were fabricated with the one piece cathode support clip. Thirteen tubes from the lot of 250 tubes fabricated with hard solder anode seals were tested electrically and mechanically. The tubes and associated data have been submitted for Qualification Approval and the results are presented in tabular form. Life test data of two tubes fabricated with hard solder anode is also included. (Author)

AD-275 467 Div. 8, 5
(TISTE/CDM) OTS price $12.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
A CRITERION FOR THE STATISTICAL COMPARISON OF COMMUNICATION SYSTEMS,
by T. L. Grettenberg. Feb 62, 153p. incl. illus. 25 refs. (Rept. no. 6-90-62-22)
Unclassified report

DESCRIPTORS: *Communication systems, *Communications theory, *Statistical analysis, *Information theory, Standards, Test methods, Mathematical analysis, Errors, Coding, Theory, Distribution theory, Functional analysis.

The methods of comparing statistical experiments are investigated as possible criteria for comparing communication systems. It is found that one method of comparison (the divergence criterion) is implied by each of the comparison criteria considered. The divergence of a system is shown to have two interpretations in terms of the performance of the communication system. The expected value of the divergence may be interpreted as the difference between the average information the received signal provides about the transmitted message and the average information the received signal provides about a message which was not transmitted. The second interpretation relates the maximin divergence and the receiver error probability. The maximin divergence is defined as the maximum attainable value of the smallest divergence between two distinct hypothesis to be tested at the receiver. The maximin divergence may be used to select an optimum communication system from a class of communication systems to be compared. This procedure is illustrated in four signal-selection problems. (Author)

AD-275 470 Div. 8, 1
(TISTP/WH) OTS price $1.60

Lincoln Lab., Mass Inst. of Tech., Lexington.
DIVISION 3. RADIO PHYSICS.
Quarterly progress rept., 1 Jan-31 Mar 62. 15 Apr 62, 10p.
(Contract AF 19(604)7400)
(AFESD TDR 62-86) Unclassified report

DESCRIPTORS: *Radio waves, Propagation, *Radio communication systems, *Antennas, Antenna radiation patterns, Radio astronomy, Extremely low frequency.

Contents: Radio Propagation - Group 33; Solar Radar Studies, Launch Phase Studies, Plasma Studies, and Lunar Radar Studies. Communication Techniques - Group 34; Polaris, Radar Astronomy, ELF Noise Observations, and Communication and Detection Theory. Communication Systems - Group 36; West Ford Experiment and Advanced Development and Theoretical Studies. Surveillance Techniques - Group 314. Antennas - Group 315; El Campo Antenna, West Ford Antenna and Microwave Component System, Multiple Horn Feed for a Paraboloid, Millstone Hill Radar, Passive Reflecting Systems for Satellite Communications, Various Computer Programs, and Antenna Test Range.

AD-275 495 Div. 8
(TISTE/CDM) OTS price $2.00

Office of Naval Research, Washington, D. C.
CONFERENCE ON NAVY LABORATORY MICROELECTRONICS PROGRAM HELD AT HOWARD COUNTY LABORATORY, APPLIED PHYSICS LABORATORY, THE JOHNS HOPKINS UNIVERSITY, JUNE 12, 13, 1961.
1961. 66p. incl. illus. 10 refs. (Rept. no. ONR-11)
Unclassified report

DESCRIPTORS: *Conferences, *Microminiaturization (Electronics), *Molectronics, *Naval research laboratories, Solid state physics, Semiconductors, Pulse amplifiers, Packaging, Electronic circuits, Superconductivity, Cryogenics, Computers, Neuromuscular transmission, Navigation, Satellite vehicles, Guided missiles, Surface to air.

Proceedings of the Navy Laboratory Microelectronics Program Conference are reported. This conference was attended by about 100 representatives of Navy laboratories, Navy departmental personnel, and contractors. The conference was originated to promote and facilitate information exchange between units of the Navy concerned with microelectronics as ultimately applied to naval equipment. Essentially the conference consisted of reports from representatives of the Navy laboratories on their programs and plans, reports on progress of conduct of work by Navy contractors, and a general discussion of the most salient parts of the program. (Author)

AD-275 533 Div. 8, 25
(TISTP/WH) OTS price $15.50

Stanford Research Inst., Menlo Park, Calif.
FLUX SWITCHING IN MULTIPATH CORES,
by D. Nitzan. Nov 61, 212p. incl. illus.
151 refs. (Rept. no. 1)
(Subcontract to Jet Propulsion Lab., Pasadena, Calif., Contract NASw-6)
Unclassified report

DESCRIPTORS: *Ferrite cores, Magnetic fields, Switching circuits, Memory devices.

A multipath ferrite core is divided into legs whose properties constitute the flux-switching characteristics of the core. Flux switching due to rotation of magnetization and domain growth is divided into elastic and inelastic components. The switching characteristics of each individual leg are expressed in terms of the static flux F loop, elastic parameter e and inelastic parameters rho and F sub o. Based on these parameters, each leg is represented by an electrical-circuit analogue. The assembly of these analogues, according to the physical layout of the individual legs, represents the electrical-circuit analogue of the multipath core. Continuous-output flux, which results from setting a multipath core followed by switching the set flux back and forth around a minor aperture, is plotted versus the SET MMF, with the minor-aperture DRIVE MMF as a parameter. Various switching effects, caused by the geometry of a multipath core in conjunction with an external MMF, are discussed. Flux patterns in a multipath core are described simply by an arrow model. In analogy to domain wall theory, a more detailed model in terms of zone boundaries is proposed, and zone patterns for different flux states are suggested. Analyses of flux patterns based on solving Laplace's equation are evaluated. (Author)

AD-275 540 Div. 8, 25, 26
(TISTE/CAM) OTS price $4.60

Westinghouse Electric Corp., Dayton, Ohio.
500 C SILICON CARBIDE RECTIFIER PROGRAM.
Interim technical progress rept. no. 2, 1 Jan-31 Mar 62,
by H. C. Chang, R. B. Campbell and others.
Apr 62, 34p. incl. illus. table, 2 refs.
(Contract AF 33(657)7027)
(ASD TR 7-727(2)) Unclassified report

DESCRIPTORS: *Crystal rectifiers, *Crystals, Production, *Manufacturing methods, High temperature research, Vacuum furnaces, Semiconductors, Rectifiers, Design, Electrical properties, Carbides, Silicon compounds, Growth, Diffusion, Sublimation, Guided missiles, Satellite vehicles, Supersonic planes.

Hexagonal silicon carbide crystals were grown in a Kroll-type furnace by the sublimation technique. To obtain greater control over the growth variables, a new furnace was designed and assembled. Experiments continued concerning the controlled growth of silicon carbide on seeds. The research on grown junction crystals emphasized the determination of conditions for the preparation of crystals (1) with a high degree of surface and internal perfection and (2) of sufficient size to carry the required current. Aluminum-diffusion experiments resulted in junctions with milliampere current carrying capacity. Methods and materials of device fabrication were studied and revised to meet the specification of vacuum tight operation for 1000 hours at 500 C. Electrical characteristics are given for an exceptional encapsulated rectifier at 300, 400, and 500 C. (Author)

AD-275 563 Div. 8
(TISTE/CDM) OTS price $4.60

Cruft Lab., Harvard U.,.Cambridge, Mass.
THE LONG, CYLINDRICAL ANTENNA: CURRENT AND ADMITTANCE,
by Keigo Iizuka, Ronold W. P. King, and Sheila Prasad. 25 Jan 62, 22p. incl. illus.
13 refs. (Technical rept. no. 351)
(Contract Nonr-186632, Proj. NR-371-016)
Unclassified report

DESCRIPTORS: *Dipole antennas, *Electric currents, *Admittance, *Impedance matching, Theory, Tests, Measurement, Antenna couplers, Transmission lines, Coaxial cables, Antennas.

A study was made of the long, cylindrical antenna. The driving-point admittance, the relative amplitude, and the phase distributions of the current are given for long cylindrical dipole antennas ranging in electrical half-length from beta-h = 0.3 to beta-h = 63.1 when driven by a two-wire line. The measured values of the driving-point admittance are in good agreement with the King-Middleton second-order-theory for the shorter lengths of antennas and with Wu's theory for the longer lengths. Particular care was taken to determine the influence of an unbalanced feeding line on both the driving-point admittance and the current distribution on the antenna. The measured driving-point admittance of the long antenna was extrapolated to that of the infinite length. The current distributions on the halves of the antenna when driven by symmetric currents (completely unbalanced line) and by anti-symmetric currents (balanced line) are compared. (Author)

AD-275 564 Div. 8, 5,
(TISTE/CDM) OTS price $5.60

Cruft Lab., Harvard U., Cambridge, Mass.
CERTAIN RESULTS IN PULSE TRANSMISSION THEORY,
by Donald W. Tufts. 5 Feb 62, 43p. incl. illus.
26 refs. (Technical rept. no. 355)
(Contract Nonr-186616, Proj. NR-372-012)
Unclassified report

DESCRIPTORS: *Pulse communication systems, *Communications theory, *Radio interference, *Noise (Radio), *Radiofrequency pulses, Coding, Sampling, Integral transforms, Fourier analysis, Statistical analysis, Statistical processes, Amplitude modulation, Wave analysis, Pulse modulation.

Some results that pertain to the problem of controlling intersymbol interference and additive noise interference in a certain type of pulse transmission system are discussed. In this type of system, an amplitude modulated, periodic pulse train is the input to a noisy, linear, and time invariant transmission medium. At the receiver, the amplitude of each transmitted pulse is estimated by performing a weighted integration of the received waveform. A pulse code modulation link is a special case of such a system. Considering interference to be the mean square difference between a transmitted pulse amplitude and the receiver's estimate of this amplitude, an expression is derived for the minimum interference that is possible in the case of transmitted pulses of finite energy. An explicit method is also presented for specifying a transmitted pulse shape and a receiver weighting function which permit the minimum interference to be attained. The ways in which the minimum interference is affected by the transmitted data rate, the type of transmission medium, the noise power density spectrum, and the transmitted pulse energy are explored and compared with previous results. (Author)

AD-275 576 Div. 8
(TISTE/NTM) OTS price $8.10

Electronic Communications, Inc., Timonium, Md.
MILLIMETER WAVE COMPONENT RESEARCH.
Final rept.,
by F. Sobel, M. Cohn and others. Mar 62, 67p. incl. illus. tables, 18 refs.
(Contract AF 19(604)5475, Proj. 4600)
(AFCRL 62-174) Unclassified report

DESCRIPTORS: *Microwaves, *Waveguides, *Radio transmission, *Transmission lines, *Semiconductors, Propagation, Extremely high frequency, Attenuation, Dielectrics, Klystrons, Frequency multipliers, Ferrites, Phase shifters, Crystal mixers, Measurement, Mathematical analysis, Wave transmission, Diodes.

Components and techniques for the generation, transmission, and detection of energy in the 100 to 300 gc frequency region were investigated. An analysis of phase-correcting Fresnel zone plates was carried out and a number of zone plates were designed, constructed and successfully tested at frequencies near 140, 210, and 280 gc. The zone plates were used at 140 and 210 gc to make relatively long path transmission measurements and were compared experimentally with dielectric lenses of conventional design. Quarter-period zone plates were used in a Michelson interferometer for the measurement of the dielectric properties of a number of materials and for tests of the frequency stability of a klystron. A detailed theoretical analysis was performed for the propagation characteristics of single-conductor transmission lines, and attenuation calculations were made for several dielectric image lines. Experimental measurements were made at 105 and 140 gc on these two types of surface waveguides. Excitation analyses were carried out for circular cross-section dielectric rod and uncoated metal wire surface waveguides to determine possible launching efficiencies. (Author)

AD-275 585 Div. 8, 30
(TISTE/CDM) OTS price $6.60

Digital Computer Lab., U. of Illinois, Urbana.
A STUDY ON SATURATION PHENOMENA,
by Sergio T. Ribeiro. 9 Apr 62, 64p. incl. illus. tables (Rept. no. 115)
(Contract Nonr-183415)
Unclassified report

DESCRIPTORS: *Transistors, *Physical properties, Admittance, Measurement, Tests, Theory, Mathematical analysis, Electronic circuits, Amplifiers, Test equipment, Digital computers.

An investigation was made of junction transistor behavior under saturation conditions to acquire some insight into the physical phenomena involved in saturation. The chief purpose was to find, even if in a qualitative way, the relative importance of the physical phenomena involved in saturation on the general degeneration of transistor properties. Measurements were made of the small signal parameters of the equivalent circuit of the biasing emitter current and collector voltage, because these are the parameters that best represent (in a first approximation) the physical properties of the transistor. The theoretical values of these parameters were evaluated as functions from standard junction transistor theory and these theoretical results were checked against experimental results. Mesa transistors were selected as samples for the experiment. (Author)

AD-275 595 Div. 8, 30
(TISTP/WH) OTS price $3.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
ELECTRON BEAM ANALYZER,
by Lynn E. Paul. Apr 62, 28p. incl. illus.
(Technical rept. no. 51; Rept. no. 03736-13-T)
(Contract AF 30(602)2303, Proj. 5573)
Unclassified report

DESCRIPTORS: *Electron guns, *Electron beams, Analysis, *Density, Measurement, Test methods.

A universal electron beam analyzer has been developed to determine velocity and current density variations in all types of electron guns. The unit consists of a large bell jar containing measurement equipment and an adjustable mounting mechanism for the electron gun. External controls allow axial and transverse displacement of the electron gun. A high capacity ion pumping system is attached to the bell jar through a six-inch manifold. Vacuum gauges and a complete metering system are part of the unit and a pulser rated at 2000 volts and a variable duty cycle of 1, 2, 3 and 5 percent with a repetition rate of 100, 200, 300 and 500 cps respectively are part of the auxiliary equipment. Typical results obtained from various electron guns analyzed in the equipment are given indicating the over-all versatility of the unit. (Author)

AD-275 597 Div. 8
(TISTE/CRJ) OTS price $12.50

Office of Research Administration, U. of Michigan, Ann Arbor.
PRECISE FREQUENCY SYNTHESIS USING NONPRECISE TUNING COMPONENTS.
Doctoral thesis,
by T. W. Butler, Jr. June 61, 164p. incl. illus. tables, 30 refs. (Technical rept. no. 120; Rept. no. 2899-52-T)
(Contract DA 36-039-sc-78283, Proj. 3A99-06-001-01)
Unclassified report

DESCRIPTORS: *Radiofrequency generators, *Tuning circuits, *Tuning devices, *Solid state physics, Synthesis, Electronic circuits, Oscillator circuits, Crystal oscillators, Tuned circuits, Capacitors, Diodes, Phase studies, Ferroelectric materials, Digital systems, Mathematical analysis.

Effort concerns the effective utilization of nonprecise tuning components in unique techniques for precise frequency synthesis. These components are solid-state devices, such as variable capacitance diodes, ferroelectric capacitors, and controllable inductors. Combining a discrete-frequency reference and an electronically-tuned phase-lock oscillator in the generation of precise frequencies makes it possible to construct a unit whose output frequency can have certain discrete values. This unit, called a discrete-frequency generator, has an output frequency which is precisely one of the harmonics of the discrete-frequency reference. By using several discrete-frequency generators, each with different incremental steps, combining, and taking the mixed output, it is possible to cover a wide over-all range in small incremental steps. The design and construction of a discrete-frequency synthesizer which tunes over a 1-mc range in 10-kc steps (two significant figures) is carried out to demonstrate the practicability of the proposed technique. (Author)

AD-275 599 Div. 8
(TISTE/NTM) OTS price $2.60

Naval Weapons Lab., Dahlgren, Va.
A STUDY OF THE NEAR FIELD BEHIND A PARABOLIC ANTENNA,
by Leon J. Lysher. 15 May 62, 20p. incl. illus. 9 refs. (NWL rept. no. 1804)
Unclassified report

DESCRIPTORS: *Parabolic antennas, *Radiation hazards, *Electromagnetic fields, Antennas, Electromagnetic waves, Electromagnetic properties, Antenna radiation patterns, Lobing, Waveguides, Antenna horns, Mathematical analysis, Naval ordnance, Hazards, Radiation effects.

The near-field behind a parabolic antenna is analyzed using the geometrical theory of diffraction. Equations are developed to calculate the field behind an antenna of arbitrary size, focal length and aperture field distribution. These equations are then applied to a particular antenna. The results are then compared with the measured field; it is found that there is a good agreement at angles up to 70 degrees from the axis of symmetry. (Author)

AD-275 602 Div. 8
(TISTP/WH) OTS price $5.60

New York. U., Coll. of Engineering, N. Y.
INDUCTIVE PROBABILITY AS A DECISION CRITERION FOR COMMUNICATION SYSTEMS,
by Bernard Harris. 15 Jan 62, 47p. incl. illus. 15 refs. (Scientific rept. no. 9)
(Contract AF 19(604)6168, Proj. 4610)
(AFCRL 62-71) Unclassified report

DESCRIPTORS: *Communications theory, Statistical analysis, *Statistical processes, Feedback, Signal-to-noise ratio, Probability.

Decision theory is discussed from the viewpoint of inductive probability. For unity in the presentation the well-known Bayes' and Likelihood Tests are reviewed. The technique of sequential observations is then considered. These decision criteria are discussed from a game theory approach to emphasize the dependence of the criteria on the a priori probabilities, conditional probabilities, and costs. The concept of inductive probability is introduced and several examples are given to show its applicability. Two important applications are considered: decision feedback systems and signal-to-noise ratio estimation. (Author)

AD-275 609 Div. 8
(TISTE/CAM) OTS price $3.60

Office of Research Administration, U. of Michigan, Ann Arbor.
STUDY AND INVESTIGATION OF A UHF-VHF ANTENNA.
Quarterly progress rept. no. 7, 1 Oct 61-1 Jan 62,
by A. T. Adams, R. M. Kalafus and others. Mar 62, 30p. incl. illus. (Rept. no. 3667-7-P)
(Contract AF 33(616)7180, Proj. 03667)
Unclassified report

DESCRIPTORS: *Antennas, *Biconical antennas, *Loop antennas, *Slot antennas, *Helical antennas, Ultra high frequency, Very high frequency, Wave transmission, Waveguides, Antenna horns, Diffraction, Spheres, Cylindrical bodies, Impedance, Standing wave ratios, Measurement, Ferrites.

Theoretical work to date is discussed in relation to the particular antenna characteristics which are emphasized in each particular study. It is noted that two of the studies are basic and include information on almost all of the characteristics. These two studies are the rectangular, cavity-backed, slot antenna and the ferrite biconical antenna. The experimental data on six different antenna models are shown. The data indicate that it is possible to reduce the size of an antenna with ferrite loading by a factor of two or three without serious deterioration of other characteristics. Because of the losses in the ferrite powder used, certain reservations must be placed on this tentative conclusion. (Author)

AD-275 713 Div. 8, 14
(TISTM/REB) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PRELIMINARY INVESTIGATIONS ON THE MECHANICAL DESIGN OF HARDENED FOAM RADOMES,
by R. A. Muldoon. 3 May 62, 34p. incl. illus. tables, 7 refs. (Rept. no. 71G-4)
(Contract AF 19(604)7400)
(AFESD TDR 62-90) Unclassified report

DESCRIPTORS: *Radomes, Design, *Expanded plastics, Tests, Buckling, Deformation, Configuration, Shock tubes, Model tests, Polymers, Urethanes, Esters.

All static and dynamic tests developed at Lincoln Laboratory which relate to the evaluation of polyurethane foam systems for the construction of hardened foam radomes are presented. Hydrostatic buckling tests were made on spherical cap specimens 27.5 in. in diameter, 4.27 in. high, and 11/32, 11/16 and 1 3/8 in. thick fabricated to different density levels. The critical pressure required to buckle the cap specimens is expressed as a function of the foam density, and thickness to radius. The response of scale model foam radomes, 27.5 in. in diameter and 19.5 in. high, to blast overpressure loads was investigated by subjecting models to shock overpressures of increasing intensity, generated by primacord detonations within a 6-ft diameter shock tube, until failure resulted. Three different foam density levels, 10, 13 and 16#/cu ft, were investigated for a shell thickness of 11/16 in. and 3 different shell thicknesses, 11/32, 11/16 and 1 3/8 in., for a foam density level of 10#/cu ft. Sufficient evidence was compiled to demonstrate that polyurethane foam materials can be used to construct a hardened radome capable of withstanding 5 psi free-air blast overpressures. (Author)

AD-275 714 Div. 8
(TISTP/WH) OTS price $2.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
RESEARCH AND DEVELOPMENT ON HIGH-POWER CRESTATRONS FOR THE 100-300 MC FREQUENCY RANGE.
Quarterly progress rept. no. 7, 1 Jan-1 Apr 62,
by G. T. Konrad. Apr 62, 17p. incl. illus. tables (Rept. no. 03783 8-P)
(Contract NObsr-81403)
Unclassified report

DESCRIPTORS: *Microwave amplifiers, *Traveling wave tubes, Very high frequency, Triodes, Electron guns, Electrostatics, Focusing, Electron lenses, Helixes, Coupling circuits.

Extensive experimental data on the triode gun of microperveance 8.92 is presented. Extensive tests on the microperveance 4.46 gun with an

Einzel lens are proposed. A reduction in beam interception by control of the potential profile in the cathode region and an experimental investigation of optimum entrance conditions to the electrostatic forcusing system are the present avenues of approach. Some results on magnetic focusing applied to the 100-watt tube of the original design are presented. (Author)

AD-275 724 Div. 8
(TISTP/WH) OTS price $7.60

American Systems, Inc., Hawthorne, Calif.
TRANSVERSE DOPPLER PATTERN MEASUREMENT TECHNIQUE,
by H. H. Hougardy. 28 Feb 62, 65p. incl. illus. table, 19 refs. (Scientific rept. no. 1; ASI Technical rept. no. 62-ESD-9)
(Contract AF 19(604)8362, Proj. 5635)
(AFCRL 62-194) Unclassified report

DESCRIPTORS: *Antenna radiation patterns, *Doppler systems, Antennas, Mathematical analysis, Partial differential equations, Integral equations, Measurement.

The results are presented of an analytic investigation of the Transverse Doppler Pattern Measurement Technique for determining the far field radiation characteristics of large antennas from near field measurements. The technique is based on using Doppler signal processing to obtain the information necessary for predicting the far field patterns of large antennas in their site environments. Primary emphasis has been placed on establishing a rigorous mathematical description of the measurement process from which system parameters and performance may be determined. Results of the calculations of aperture distributions measured with this technique are presented for various aperture distributions. Far field patterns calculated from several of the measured distributions are compared with the exact far field patterns. (Author)

AD-275 726 Div. 8, 30
(TISTE/CAM) OTS price $2.60

Airborne Instruments Lab., Deer Park, Long Island, N. Y.
NEW METHODS FOR MEASURING SPURIOUS EMISSIONS.
Quarterly progress rept. no. 3,
by J. Goldberg, O. Hinckelmann and others.
Feb 62, 19p. illus. 3 refs. (Rept. no. 1112-I-3)
(Contract AF 30(602)2511, Proj. 1112)
(RADC TDR 62-148) Unclassified report

DESCRIPTORS: *Radar transmitters, *Radio transmitters, *Electromagnetic waves, *Microwaves, *Microwave probes, *Radiofrequency power, Waveguides, Wave characteristics, Propagation, Electric fields, Measurement, Wavemeters, Standing wave ratios, Mathematical analysis, Test equipment, Test methods.

The experimental results obtained with two methods of measuring the spurious emission power of microwave transmitters are reported-the fixed-probe method (which measures the waveguide power by means of probes located on the boundary of an enlarged waveguide) and the movable-probe method (which measures the waveguide power by means of movable probes that scan a plane transverse to the direction of propagation in the enlarged waveguide). With the fixed-probe method an accuracy of 0.26 db was obtained at 9.755 kmc when measuring the waveguide power with a typical S-band doorknob coaxial-to-waveguide transition. SWR and high-power tests made on the new multimode load are described. High-power tests of the line-stretcher and fixed-probe section at a level of 3.1 megawatts gave no indication of breakdown. A new four-band fixed-probe section and a trombone-type line stretcher are described. In connection with the movable probe method, the directivity of the new Z-axis balanced dipole probe was greater than 14 db at 3.8 and 5.0 kmc. At 5.0 kmc, a power measurement accuracy of 0.04 db was obtained. The new probes were tested at a level of 500 kw with no indication of breakdown. (Author)

AD-275 735 Div. 8, 26
(TISTE/CDM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE IMPREGNATED CATHODE,
by Alois Vyslouzil. 1 May 62, 14p. incl. illus. 6 refs. (Trans. no. FTD-TT-62-159 of Slaboproudy Obzor, 22, no. 6:pp. 338-342, 1961)
Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Impregnation, *Manufacturing methods, *Microwave equipment, *Electron tubes, USSR, Tungsten, Electrodes, Barium compounds, Oxides, Chemical reactions, Radiofrequency power, Porosity, Tests, Design.

A summary is given of the requirements for modern power cathodes. The technological development of impregnated cathodes, their emitting properties, their function, and chemical processes is presented. The composition of the emitting substance, the preparation of the cathode body, the procedure for measuring porosity; impregnation, evacuation, and activation are described. Advantages are pointed out which render this cathode a powerful source of electrons with long service life and high resistance to high voltage gradients and residual gases. (Author)

AD-275 755 Div. 8, 6
(TISTE/NTM) OTS price $4.60

Hughes Aircraft Co., Culver City, Calif.
AN EXPERIMENTAL SIMULTANEOUSLY SCANNED ANTENNA SYSTEM,
by W. H. Kummer, F. G. Terrio and A. T. Villeneuve. Dec 61, 40p. incl. illus. table, 4 refs. (Rept. no. P61-28; Scientific rept. no. 2)
(Contract AF 19(604)8006)
(AFCRL 62-85) Unclassified report

DESCRIPTORS: *Radar antennas, *Radar scanning, *Electronic scanners, *Slot antennas, Switching circuits, Diodes, Electronic switches, Waveguide switches, X band, Antenna radiation patterns, Frequency modulation, Antenna filters, Sidebands, Phase measurement, Radar transmitters.

An experimental receiving antenna is described in which, through time modulation of its aperture distribution, angle-of-arrival information is obtained. By proper signal processing this information is effectively transformed to a group of simultaneous multiple beams with different beam pointing directions. Thus, an effective scanning antenna is produced without the use of variable phase shifters or mechanical motion of the array. A five-element simultaneously scanned system was constructed and tested. The antenna is an array of X-band slot radiators fed from a common feed guide through separate branch guides. Diode switches in the branch guides perform sequential on-off switching which provides the aperture modulation function. The fundamental modulation frequency is 10 kc. The output of the

array is fed into a receiver whose bandwidth is 6 kc and which separates the various sideband frequencies. The general operation of this system is described and measured patterns at the carrier and sideband frequencies are shown. (Author)

AD-275 760 Div. 8
(TISTP/WH) OTS price $13.50

Radiation Lab., Johns Hopkins U., Baltimore, Md.
THE TUNNEL DIODE: A NEW MICROWAVE DEVICE,
by L. E. Dickens. May 62, 197p. incl. illus. tables, 32 refs. (Technical rept. no. AF-92)
(Contract AF 33(616)6753)
Unclassified report

DESCRIPTORS: *Semiconductors, *Diodes, Electrical properties, Resistance, Noise (Radio), Electrical networks, Microwave amplifiers.

The heavily doped semiconductor diode (tunnel diode) exhibits a negative resistance characteristic over a small voltage range in the forward-biased direction, typically of the order of several tenths of a volt. A brief history is given of the discovery of this negative resistance characteristic. The nature of the discovery essentially the tunneling effect as predicted by the theories of quantum mechanics, is discussed. Also to be considered are the basic questions of frequency limitation of the tunnel diode and its relative merits as compared with the parameteric amplifier and the maser. The analysis includes the development of the equivalent circuit and demonstrates its use. The equivalent circuit shows not only the necessary R, L, and C components but also the sources of electrical noise. The negative resistance amplifier and the frequency converter are examined for gain, bandwidth, noise figure, and stability. Finally, some general notes are presented on both the amplifier and the frequency converter, and their applications. (Author)

AD-275 764 Div. 8, 25
(TISTE/CDM) OTS price $9.60

Kaiser Industries Corp., Palo Alto, Calif.
INVESTIGATION OF SOLID-STATE DELAY LINES.
Final rept.
30 Apr 62, 107p. incl. illus.
(Subcontract to Douglas Aircraft Co., Inc., El Segundo, Calif., Contract Nonr-107600)
Unclassified report

DESCRIPTORS: *Solid state physics, *Solid delay lines, *Display systems, *Switching circuits, *Television display systems, Tests, Design, Pulse generators, Delay lines, Phosphors, Luminescence, Electronic circuits, Operation, Digital systems, Brightness, Radio-frequency oscillators, Diodes.

Research was conducted on solid-state display circuitry. Of the two basic items needed for a display panel, a control apparatus and a light controlling medium, efforts were directed only toward the control apparatus. The work has progressed to a point where it stands as a major breakthrough in electronic switching (commutating) or crossed-field (crossed-grid) panels, using electroluminescent phosphor or other light controlling media. The switching system is described, including the digital arrangement which removes the normal limitations on resolution. An automatic phasing scheme is also explained. The 40 x 40 and the 100 x 100 line breadboard displays and the 100 element bar graph are described. Also covered are the various types of delay lines studied, as well as nanosecond pulse techniques and pulsers, and assembly methods of EL panels. (Author)

AD-275 765 Div. 8, 25, 5, 30
(TISTP/MFA) OTS price $19.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 62,
by H. J. Zimmerman, G. G. Harvey, and W. B. Davenport, Jr. 15 Apr 62, 305p. incl. illus. tables, refs.
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000)
Unclassified report

DESCRIPTORS: Scientific reports, *Plasma physics, *Electronics, *Communications theory, Biochemistry, Physical chemistry, Microwave spectroscopy, Masers, Nuclear magnetic resonance, Hyperfine structure, Microwaves, Molecular beams, Radio astronomy, Magnetohydrodynamics, Information theory, Languages, Neurology, Electrical networks, Synthesis.

Contents:
Physical electronics
Biophysical chemistry
Microwave spectroscopy
Optical and infrared masers
Nuclear magnetic resonance and hyperfine structure
Microwave electronics
Molecular beams
Radio astronomy
Noise in electron devices
Plasma physics
Plasma electronics
Plasma magnetohydrodynamics and energy conversion
Statistical communication theory
Processing and transmission of information
Advanced computation research
Mechanical translation
Linguistics
Communications biophysics
Neurology
Cutaneous sensory mechanisms
Network synthesis

AD-275 787 Div. 8, 14, 26
(TISTM/BRW) OTS price $4.60

New Jersey Ceramic Research Station, Rutgers U., New Brunswick.
DEVELOPMENT OF REFRACTORY CERAMICS THAT CAN BE PROCESSED AT TEMPERATURES CONSIDERABLY LOWER THAN THEIR MAXIMUM USE TEMPERATURE.
Final rept., 1 Dec 60-1 Apr 62,
by Edward J. Smoke and John H. Koenig. 1 Apr 62, 43p. incl. illus. tables.
(Contract NOw 61-0211-c)
Unclassified report

DESCRIPTORS: *Radomes, Materials, Processing, *Ceramic materials, *Refractory materials, Aluminum compounds, Magnesium compounds, Silicon compounds, Oxides, Preparation, Sintering, Physical properties, Density, Porosity, Crystal structure, Solid state physics, High temperature research, Electrical properties, Mechanical properties, Glass, Crystallization, Melting.

Attempts were made to develop refractory ceramics for radomes that can be processed at temperatures considerably lower than their maximum use temperature. High alumina bodies containing 94 and 96% Al_2O_3, were developed with excellent engineering properties when matured in the range 2600 to 2800 F. The low maturing temperature and the excellent physical properties of these bodies were attributed to a presintering process. Studies were initiated on the mechanisms that

enable a presintered body to mature at lower temperatures with superior physical properties. The incorporation of a devitrifiable glass in an alumina matrix and the total fritting of a refractory composition were also investigated. (Author)

AD-275 800 Div. 8, 25
(TISTP/WH) OTS price $3.60

AVCO Everett Research Lab., Mass.
THE HALL AND ION SLIP EFFECTS IN A NON-UNIFORM GAS,
by R. J. Rosa. Dec 61, 33p. incl. illus. 7 refs.
(Research rept. no. 121)
(Contract AF 04(694)33)
(AFBSD TR 61-80)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Generators, Gases, Hall effect, Electrical properties, Conductivity.

Under conditions that result in strong Hall or ion slip effects, a uniform and a non-uniform gas can behave much differently as conductors of electricity. An ohms law for a non-uniform gas is derived. It is used to study the performance of normal current and Hall current MHD devices and also the possibility for obtaining significant electron heating or extra thermal ionization. An indication is obtained of the degree of engineering sophistication that will be required to obtain good performance where the product of the particle mean free time between collisions and particle cyclotron frequency was high. (Author)

AD-275 821 Div. 8
(TISTE/NTM) OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
HIGH POWER SEMICONDUCTOR PHASE SHIFTING DEVICES.
Quarterly progress rept. no. 1, 1 Jan-31 Mar 62,
by Charles Howell and Joseph White. May 62,
15p. illus.
(Contract NObsr-87291)
Unclassified report

DESCRIPTORS: *Semiconductors, *Phase shifters, *Microwave equipment, *Diodes, *Electronic scanners, Electronic circuits, Radiofrequency power, Transmission lines, L band, S band, Waveguide couplers, Switching circuits, Voltage.

Research concerns microwave phase-shifting techniques, excluding ferromagnetic and mechanical methods, recommendations for new phase-shifting techniques which provide improved electrical scanning, and development of models of a phase shifter utilizing these techniques. Two general phase-shifting techniques were investigated, both of which employ semiconductor elements. The first approach is the step or incremental phase-shifting device which provides for discrete changes in phase. The second phase-shifting approach is a continuously variable one which provides for a greater flexibility in phase control. Both the semiconductor material and the circuit problems involved in each of these two approaches have been further explored in some detail. Results indicate that both the desired phase-shifting characteristics as well as power-handling capabilities can be reached. Phase shifters were built for L-band which, for the incremental type, can handle peak powers in excess of 75 kw, and for the continuous type can handle 2 - 6 kw peak power. (Author)

9. FLUID MECHANICS

AD-275 373 Div. 9
(TISTA/VGW) OTS price $1.00

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF EQUILIBRIUM WALL TEMPERATURE BY GRAPHICAL MEANS,
by Paul Czysz and Richard R. Smith. Feb 62, 26p. incl. illus. tables, 3 refs. (ASD TDR 62-71)
(Proj. 1426)
Unclassified report

DESCRIPTORS: *Re-entry aerodynamics, *Aerodynamic heating, Thermal radiation, Cooling, Conical bodies, Sheets, *Hypervelocity vehicles, Re-entry vehicles, Laminar boundary layer, Turbulent boundary layer, *Heat transfer, Enthalpy, Thermodynamics, Mathematical prediction.

Assuming the wall to have zero heat capacity and conductivity, an energy balance is written across the surface of a vehicle equating the aerodynamic heat transferred to the wall to the heat radiated from the wall surface. Laminar and turbulent flow are considered over the following shapes: axisymmetric, 2-dimensional leading edge, flat plate, and pointed cone. The energy balance equation is reduced in terms of equilibrium wall temperature (Tw) and parameters for the above surface shapes. Graphical solutions of the resulting equations are presented allowing Tw to be found at any point on the above surfaces. An additional relationship is presented, along with its associated plots, allowing the heating rate to the surface to be found at any point. (Author)

AD-275 385 Div. 9, 1
(TISTA/GEC) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SOME STATISTICAL ANALYSES RELEVANT TO ESTABLISHING STRUCTURAL DESIGN CRITERIA FOR AIRCRAFT IN MANEUVERING FLIGHT.
Final rept.,
by Charles B. Notess. 9 Mar 62, 124p. incl. illus. tables, 17 refs. (Rept. no. AC-1578-F-1)
(Contract NOw 61-0770-c)
Unclassified report

DESCRIPTORS: Aircraft, *Airplanes, *Airframes, Flight testing, *Aerodynamics, Dynamics, Structures, Design, Maneuverability, Motion, Gust loads, *Load distribution, Fatigue (Mechanics), Statistical analysis, Probability, Aerodynamic data, Tables, Fighters, Patrol planes, Jet fighters, Jet bombers, Commercial planes.

Time histories of typical maneuvers by operational aircraft were used as a basis for statistical analyses which would be pertinent for specification of structural design criteria. Probability distributions and power spectral densities are compared for various types of mission and aircraft. The analysis showed that the primary factor contributing towards variability was the type of mission. The spectral analyses indicated that the predominant frequencies present in maneuver motions and the frequencies which appeared to be closely related to peaks in the time histories, were governed by both the character of the mission and the dynamic characteristics of the aircraft. Schemes for discriminating between maneuver motions and gust induced motions were examined. Variations in the relative behavior of pitch and load factor at high frequencies are a good means for discrimination. Pilot variability

was explored. The data does not indicate sufficient variability to cause concern about masking out the effects of different missions or otherwise complicating specification of maneuver motions. A statistical model, which represents the high and the low frequency character of maneuver motions in separate forms, was suggested for providing fatigue analysis information. (Author)

AD-275 426 Div. 9, 25
(TISTP/MFA) OTS price $6.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
HYDRODYNAMIC STABILITY OF SOME SPATIALLY PERIODIC FLOWS.
Rept. of Proj. MICHIGAN,
by Thomas J. Eisler. May 62, 62p. incl. illus. 23 refs. (Rept. no. 2900-327-T)
(Contract DA 36-039-sc-78801)
Unclassified report

DESCRIPTORS: *Hydrodynamics, *Algebraic topology, *Reynolds number, *Stability, Fluid flow, Boundary layer, Velocity, Motion, Equations, Perturbation theory, Viscosity, Polynomials, Integral equations, Matrix algebra.

The stability of the incompressible, boundary-free, parallel flow whose velocity profile is the cosine is considered. A two-dimensional cellular flow is also considered. The method of small perturbations is used to linearize the equations of motion about the basic flow. The boundary condition imposed is that the perturbation shall be bounded in space. The time dependence of the perturbation, assumed exponential, is chosen so that stability depends on the imaginary part of a parameter, c, which is considered to be the eigenvalue. Other parameters of interest are the Reynolds number, R, and, for the parallel flow, the wave number of the perturbation, alpha. Formulating the eigenvalue equation as the vanishing of an infinite determinant aids in calculating the neutral curve near the critical Reynolds number. The curve intersects the R axis at Rc. For large values of R it approaches alpha = 1 asymptotically. The eigenvalue spectrum consists of an infinity of bands, separated by small gaps, lying along the imaginary axis of the c plane. (Author)

AD-275 431 Div. 9, 30
(TISTA/VGW) OTS price $3.60

David Taylor Model Basin, Washington, D. C.
INVESTIGATION OF HEAT-TRANSFER TESTING IN INTERMITTENT WIND TUNNELS. PART I. SOLID CONES IN SUPERSONIC TUNNELS,
by William L. Haberman and Ernest E. Harley. Apr 62, 28p. incl. illus. table, 9 refs. (AERO rept. no. 1007)
Unclassified report

DESCRIPTORS: *Supersonic wind tunnels, Wind tunnel models, *Model tests, *Conical bodies, Cylindrical bodies, Supersonics, *Heat transfer, Boundary layer, Shock waves, Mach number, Tests.

A heat transfer investigation was conducted in the intermittent supersonic wind tunnels on two solid copper cones of approximately 50 degrees included angle. The primary purpose of the investigation was to determine the effects of tunnel run times, Mach number, and other parameters on the heat-transfer coefficient. The investigation was also to provide heat-transfer testing techniques for the proposed Hypersonic Test Facility. The results of the investigation (presented in graphical form) show that, in general, heat-transfer coefficients calculated from temperature time histories for runs of 65 seconds duration or greater provided coefficient values with sufficient accuracy, and these values compared well with similar data obtained at other facilities. (Author)

AD-275 446 Div. 9, 31, 15
(TISTP/TL) OTS price $2.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
THE APPLICATION OF FRIEDRICHS TECHNIQUE TO THE SHIP PROBLEM. PART I. FIRST-EXPANSION PROCEDURE,
by Solomon Ciolkowski. Feb 62, 17p. incl. illus. (Research memo. no. RM-199)
(Contract Nonr-361600)
Unclassified report

DESCRIPTORS: *Ship hulls, Stresses, *Fluid flow, *Perturbation theory, *Integral equations, Operators (Mathematics), Vector analysis, *Partial differential equations, *Hydrodynamics, Water, Model tests, Model basins, Transformations (Mathematics), Functions, Green's function, Differential equations, Harmonic analysis, Velocity, Shock waves, Elasticity.

A perturbation scheme for the solution of the ship problem is described. An integral equation is obtained; the solution of this equation determines the velocity potential as well as the free surface of the fluid associated with the flow around a ship hull. The perturbation is carried out to terms of second order in the perturbation parameter. (Author)

AD-275 464 Div. 9, 27
(TISTA/GEC) OTS price $5.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
NOZZLE FLOW WITH COMPLEX CHEMICAL REACTION,
by A. A. Westenberg and S. Favin. Mar 62, 46p. incl. illus. 22 refs. (Rept. no. CM-1013)
(Contract NOrd-7386)
Unclassified report

DESCRIPTORS: *Supersonic nozzles, Wind tunnel nozzles, Rocket motor nozzles, Ramjet engine nozzles, Chemical reactions, Recombination reactions, *Reaction kinetics, Gas flow, Exhaust gases, Laminar boundary layer, Adiabatic gas flow, Mathematical analysis, Equations, Digital computers.

The equations governing the flow through a convergent-divergent nozzle of a gas in which many simultaneous elementary reactions occur are set down in general form suitable for numerical solution. The technique of solution on a high-speed computing machine is discussed. Results for a specific example, in which the flow of gas undergoing four reactions amongst the species CO, CO2, H2, H2O, H, and OH is calculated in the divergent portion of a nozzle, are presented. Various solutions are given with variations in the individual rate constants so as to show the importance of the different steps. It is shown that the slower recombination reactions of H and OH dominate the chemical influence on the gross flow. All four of the reactions freeze relatively early in the flow history, and it is shown how the Bray method (J. of Fluid Mech., 6:1, 1959) can be applied to find the separate freezing points of the elementary reactions in a complex kinetic case. (Author)

Division 9 - FLUID MECHANICS

AD-275 494 Div. 9
(TISTA/WAW) OTS price $2.60

Mississippi State U., State College.
AN INVESTIGATION OF TWO TYPES OF HOLE DISTRIBUTIONS FOR LAMINAR BOUNDARY LAYER CONTROL SYSTEMS,
by Sean C. Roberts. 2 Apr 62, 15p. illus. 5 refs.
(Research rept. no. 37)
(Contract Nonr-97801)
Unclassified report

DESCRIPTORS: *Wings, *Boundary layer control, *Area suction, *Suction slots, Aerodynamics, Laminar boundary layer, Pressure, Oscillation, Model tests, Wind tunnel models.

Wind tunnel tests were made of even and strip hole distributions for laminar boundary layer control of an airfoil by suction. The even distribution is slightly more economical in quantity flow requirements at relatively large angles of attack than the strip distribution, but it does not have the necessary range of inflow velocities in which laminar flow can exist. The strip distribution which requires the same inflow velocity as the even distribution at low angles of attack, i.e., up to approximately 4 degrees, and is less economical than the even distribution at large angles of attack, does have a large range of inflow velocities in which laminar flow can exist. It appears that for aircraft work, where the number of wing compartments are limited and the blowers cannot be continually altered to cope with changing flight conditions, the strip distribution must be chosen in preference to an even distribution. The most important frequency range of the pressure fluctuations in a boundary layer seems to be of the order of 1,000 c/s, but before these results could be used in a stability meter where all other frequencies are filtered out, more frequency spectrum of boundary layer pressure fluctuations, obtained at flight Reynolds numbers, must be analyzed. (Author)

AD-275 496 Div. 9
(TISTA/GEC) OTS price $1.50

Aerodynamic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SHOCK-TUBE MEASUREMENTS OF STEP-BLAST LOADS ON A NASA 64A010 AIRFOIL.
Rept. on Atomic Weapon Effects on Aircraft Systems,
by J. Ray Ruetenik and Walter Herrmann. Feb 62, 51p. incl. illus. table, 11 refs.
(Contract AF 33(616)6195, Proj. 1350)
(ASD TR 61-219) Unclassified report

DESCRIPTORS: *Airfoils, Aerodynamic configurations, Model tests, Load distribution, Pressure, Measurement, *Shock waves, Shock tubes, Subsonic flow, Transonics, Vortices, Boundary layer, Compressible flow, Blast.

Measurements of the transient loads on a two-dimensional airfoil set at various fixed angles of attack and subjected to a step-blast wave in shock tube are reported. The free-stream Mach number range employed was 0.4 to 1.0 and the angles of attack ranged from 15 to 60 degrees. Measurements were made using both an interferometer and pressure transducers flush-mounted in the airfoil. During the diffraction period, good agreement was obtained with linearized theory, even up to an angle of attack of 60 degrees. In the post-diffraction period the departures from linearized theory became very large after the leading-edge vortex approached the trailing edge. The transient stalling behavior is examined in detail. (Author)

AD-275 557 Div. 9
(TISTA/WAW) OTS price $1.60

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
SOME REMARKS ON INTEGRAL MOMENT METHODS FOR LAMINAR BOUNDARY LAYERS WITH APPLICATION TO SEPARATION AND REATTACHMENT,
by Lester Lees and Barry L. Reeves. 31 Dec 61, 10p. incl. illus. table, 8 refs.
(Contract AF 49(638)916)
(AFOSR-1920) Unclassified report

DESCRIPTORS: *Laminar boundary layer, *Turbulent boundary layer, Separation, Aerodynamics, Supersonics, Shock waves, Mathematical analysis, Differential equations, Partial differential equations, Integral equations.

The Karman-Pohlhausen integral method is a rather poor approximation for the analysis of laminar boundary layers in regions of adverse pressure gradient, particularly when separation occurs. It may be completely inadequate downstream of separation, between the separation and reattachment points. A constant pressure plateau is formed along the surface between these points when a flow disturbance, such as a forward facing step or incident shock wave, is of sufficient strength to cause extensive separation. This region gives rise to much of the difficulty, since the Karman-Pohlhausen method must produce an attached, Blasius type velocity profile whenever the pressure gradient vanishes. What is needed is an integral method which exhibits velocity profiles containing reverse-flow for vanishingly small adverse pressure gradients analogous to the lower branch solutions of the Falkner-Skan equation, which were found by Stewartson. The method first proposed by Walz (Ingenieur-Archiv. 16:243-248, 1948) and modified by Tani (Journ. Aero. Sci. 21:487-495, 1954) accomplishes this and eliminates the need for a certain amount of empiricism inherent in other existing methods. (Author)

AD-275 562 Div. 9
(TISTP/MFA) OTS price $5.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
LAMINAR FLOW BETWEEN TWO PARALLEL ROTATING DISKS.
Rept. on Methods of Mathematical Physics,
by Mark C. Breiter and Karl Pohlhausen. Mar 62, 45p. incl. illus. (Rept. no. ARL 62-318)
(Proj. 7071) Unclassified report

DESCRIPTORS: *Fluid flow, *Laminar boundary layer, Viscosity, *Disks, Velocity, Shear stresses, Cavitation, Pressure, Numerical methods and procedures, Partial differential equations, Functions.

The viscous flow between two parallel disks rotating in the same direction with the same velocity is investigated. The fluid enters the space between the disks at a certain radius in the radial direction. Because of the shear forces, it assumes a rotating motion with about the velocity of the disks. The centrifugal forces then build up a pressure increase in the radial direction. The arrangement corresponds to a centrifugal fluid pump. The general equations of viscous flow are simplified by the assumption that the pressure difference normal to the disks is negligible. One obtains a system of parabolic partial differential equations. For large radii the deviation from rigid body rotation (with the angular velocity of the disks) is

small. The resultant linearized equations are solved analytically. The velocity profiles depend upon a parameter containing the kinematic viscosity, the angular velocity and the distance of the disks, but not the radius. The non-linearized parabolic differential equations are approximated by a difference scheme and solved numerically. The results are given in non-dimensional form with the entrance velocity and the distance of the disks as parameters. Furthermore, the efficiency of the pump is computed from the gain of the total pressure and the torque at the shaft of the rotating disks. (Author)

AD-275 584 Div. 9, 24
(TISTP/MFA) OTS price $2.60

Dynamic Analysis and Control Lab., Mass. Inst. of Tech., Cambridge.
STEREOPHOTOGRAMMETRY APPLIED TO HYDRAULIC ANALOGUE STUDIES OF UNSTEADY GAS FLOW,
by Robert W. Mann. 30 Mar 62, 15p. illus. 7 refs. (Rept. no. 8543-1)
(Contract N140(122)61606B)
Unclassified report

DESCRIPTORS: *Stereoscopes, *Photography, Mapping, *Gas flow, Compressible flow, *Hydraulic nozzles, Hydraulic models, Velocity, Turbines, Schlieren photography, Interferometers, Optical equipment, Cameras, Measurement, Pressure, Density.

A description is presented of the equipment, techniques, and results of data acquisition and reduction by stereophotogrammetry of the time-varying surface of a water-table analogy to unsteady two-dimensional compressible gas flow. (Author)

AD-275 641 Div. 9
(TISTA/WAW) OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
METHODS OF APPROXIMATING INVISCID JET BOUNDARIES FOR HIGHLY UNDEREXPANDED SUPERSONIC NOZZLES,
by J. R. Henson and J. E. Robertson. May 62, 51p. incl. illus. 6 refs. (AEDC TDR 62-7)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Supersonic nozzles, *Hypersonic nozzles, Jets, *Jet mixing flow, Supersonics, Hypersonics, Aerodynamics, Shock waves, Mathematical analysis, Numerical analysis, Theory, Tests.

Methods of approximating inviscid boundaries of jets exhausting from axisymmetric supersonic nozzles into a quiescent atmosphere and moving streams have been developed. Jet shapes from two typical afterbody configurations were calculated for various flight conditions. Good agreement with available theoretical and experimental data was obtained. A step-by-step calculational procedure is given. (Author)

AD-275 711 Div. 9
(TISTA/GEC) OTS price $13.00

General Electric Co., Cincinnati, Ohio.
RESULTS OF WIND TUNNEL TESTS OF A FULL SCALE, FUSELAGE MOUNTED, TIP TURBINE DRIVEN LIFT FAN. VOLUME 3.
Rept. for Jan-May 61,
by Z. J. Przedpelski. Mar 62, 168p. incl. illus. tables, 15 refs.
(Contract DA 44-177-tc-584, Proj. 9R38-01-020-02)
(TREC TR 61-15, vol. 3)
Unclassified report

DESCRIPTORS: *Vertical take-off planes, Fuselage, *Turbojet engines, *Ducted fans, Shrouded propellers, Wind tunnel models, Model tests, Aerodynamics, Drag, Stability (Longitudinal), Pitch, Moments, Lift, Downwash, Pressure, Distribution.

Results are reported of wind-tunnel model tests of a tip-turbine-driven lift fan (X353-5) mounted in the fuselage of a full-scale model. Longitudinal stability margin with fan operating was increased. STOL performance was essentially unchanged. Lift loss due to throttling the fan was very sensitive to height above ground. Pitching moments (longitudinal trim requirements) in ground effect decreased at low velocity ratios, but increased at high velocity ratios because of tail downwash increase. The fan flow decrease was accompanied by hub stall by a high static pressure ratio across the rotor. Modifications to test equipment and new instrumentation are discussed.

AD-275 848 Div. 9, 25
(TISTP/MFA) OTS price $1.50

Propulsion Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ELECTROFLUIDMECHANICS: A STUDY OF ELECTROKINETIC ACTIONS IN FLUIDS.
Rept. for Apr-July 61 on Electric Propulsion Technology,
by Henry R. Velkoff. Feb 62, 44p. incl. illus. 50 refs.
(Proj. no. 3141)
(ASD TR 61-642) Unclassified report

DESCRIPTORS: *Electric fields, *Fluid flow, *Heat transfer, Viscosity, Conductivity, Electrostatics, Electromagnetic fields, Boundary layer, Electrophoresis, Gas discharges, Dielectrics, Schlieren photography, Gas ionization, Hydrodynamics.

The possible interactions between electric fields and fluids are reviewed. Many actions are found to exist, and the basis for many of the actions is discussed. The study indicates that a wide range of electrofluidmechanic phenomena have actually been observed. A significant body force can be exerted on either an ionized fluid or a neutral nonionized fluid. Since the application of electric fields to fluids may strongly affect heat transfer or the fluid boundary layer, the field of electrofluidmechanics may take its place with magnetohydrodynamics as an important physical phenomena. (Author)

AD-275 884 Div. 9, 25
(TISTP/MFA) OTS price $2.60

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
THE HYPERSONIC APPROXIMATION FOR THE SHOCK STRUCTURE OF A PERFECT GAS WITH THE SUTHERLAND VISCOSITY LAW,
by William B. Bush. Feb 62, 24p. incl. illus. 3 refs.
(Contract AF 49(638)476)
(AFOSR-2257) Unclassified report

DESCRIPTORS: *Shock waves, *Gas flow, *Hypersonics, Thermodynamics, Entropy, Enthalpy, Irreversible processes, Velocity, Kinetic theory, Temperature, Viscosity, Specific heat.

The classical Navier-Stokes treatment of the shock wave structure is investigated for a perfect gas with constant specific heats. The viscosity of the gas is prescribed according to the Sutherland law. The Prandtl number is 3/4. The limiting

forms of the solution as the upstream flow Mach number approaches infinity, with all other parameters held fixed, are studied. Two distinct asymptotic series are found for the portions of the shock adjacent to the uniform regions upstream and downstream of the shock and these expansions are matched in an intermediate region of common validity. The leading terms of a uniformly valid expansion are obtained by combining elements from both expansions. Special attention is given to the entropy and the entropy production rate in the shock wave. (Author)

10. FUELS AND COMBUSTION

AD-275 403 Div. 10
(TISTW/RD) OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
TENSILE PROPERTIES OF DOUBLE-BASE PROPELLANT,
by Elise McAbee and Mitchel Chmura. May 62, 35p. incl. illus. tables, 3 refs. (Technical rept. no. FRL TR 56)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Propellant grains, *Tensile properties, Stresses, Temperature, Loading.

Standard propellant tensile specimens were prepared from OGK, ARP, T-16, and X-8 grains. Groups of each formulation were subjected to tensile testing at 25 C and 50% RH over a range of rates sufficient to cause failure in from 0.005 to 2500 sec. Likewise the effects of temperature on the properties were studied at the highest rates and at the conventional laboratory static rate (0.1 in./in./min) over a temperature range of -60 C to 80 C. In general, the maximum and minimum tensile values did not occur at the same temperature for the high rates as for the static rates. The results of the study over six log decades of time show pronounced peaks and valleys with respect to the energy absorption and ultimate elongation, and pronounced discontinuities with respect to the modulus. All of the maximum tensile strength vs log time curves were of similar shape but had different slopes and inflection points. (Author)

AD-275 418 Div. 10
(TISTM/EJH) OTS price $2.60

Bureau of Mines, Pittsburgh, Pa.
STUDIES OF AIR FLOWS INTO UNCONTROLLED FIRES.
Interim rept. no. 2, 1 Aug 61-30 Apr 62,
by J. Grumer, A. Strasser and others. 30 Apr 62, 22p. incl. illus. tables, refs.
(Contract NAonr 24-60, Proj. NR 051-421)
Unclassified report

DESCRIPTORS: *Fires, Control, Air, Wind, Air blast, *Flames, *Combustion, Gas flow, Pressure, Theory, Test methods, Test equipment.

Flame piloting by convection currents of flame gases within the fuel bed accelerates the burning rate, while radiative heat transfer is less effective. This conclusion was based on observation of a maximum in the curve of maximum burning rate of 2 proximate fires versus spacing between them and on interpretation of wood crib fire data. Factors determining the velocity of naturally induced air currents feeding a fire are not well established. Fairly good correlation was obtained from observed air velocities induced by experimental fires matched with air velocities computed on the basis of theory involving the assumption that the pressure drop through the fuel bed for the induced air flow is equivalent to the pressure drop for the flow of fluid through a packed porous bed. This radial pressure drop was equated to the sum of the vertical buoyancy head and the vertical velocity head developed as the result of the combustion. Another factor which may influence the natural induction of air by a fire is the subatmospheric static pressures prevailing between certain proximate fires. The resulting pressure gradient may be the driving force for the induction of air through the burning fuel beds.

AD-275 427 Div. 10, 17, 14
(TISTM/REB) OTS price $1.60

Defense Metals Information Center, Columbus, Ohio.
COMPATIBILITY OF PROPELLANTS 113 AND 114B2 WITH AEROSPACE STRUCTURAL MATERIALS,
by J. D. Jackson and W. K. Boyd. 27 Apr 62, 13p. incl. illus. tables, 14 refs. (DMIC memo. no. 151)
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Liquid rocket propellants, Metals, Alloys, *Corrosion, *Physical properties, *Chemical properties, Hydrocarbons, Fluorides, Chlorides, Ethanes, Bromides, Methanes, *Halocarbons, Hydrolysis, Stability, Temperature, Toxicity, Impact shock, Plastics, Elastomers, Guided missiles, Satellite vehicles, Spaceships.

Propellants 113 (1,1,2-trichlorotrifluoroethane) and 114B2 (1,2-dibromotetrafluoroethane) were studied with respect to their corrosion properties with metals, plastics, and elastomers commonly used in missile applications. Related chemical and physical properties of these propellants were summarized including data on hydrolysis, thermal stability, toxicity, and impact sensitivity.

AD-275 537 Div. 10, 4
(TISTM/TCG) OTS price $5.60

Bell Aerosystems Co., Buffalo, N. Y.
AN INVESTIGATION OF FIELD TEST METHODS FOR DETERMINING THE WATER CONTENT OF TITAN II PROPELLANTS.
Supplemental technical rept.,
by Ralph R. Liberto. May 62, 44p. incl. illus. tables, 12 refs. (Rept. no. 8182-933005)
(Contract AF 04(694)72)
(BSD TDR 62-45) Unclassified report

DESCRIPTORS: *Liquid rocket propellants, *Rocket oxidizers, *Chemical analysis, *Water, Nitrogen compounds, Tetroxides, Methyl hydrazines, Hydrazines, Test methods, Chromatographic analysis, Infrared spectroscopy, Electrical conductance, Pressure.

The results of an evaluation of several analytical procedures for determining water content of the Titan II propellants are summarized. These are N_2O_4 as the oxidizer and a nominal 50/50 blend of unsymmetrical dimethylhydrazine and N_2H_4 as the fuel. For the 50/50 fuel blend, a

gas chromatography method, a pressure bomb method, a near-infrared spectrophotometric method, and an electrical conductivity method were considered. The electrical conductivity method is most promising. For the N2O4, a colorimetric method, a pressure bomb method, and an electrical conductivity method were considered. Again, the electrical conductivity method is most promising. (Author)

AD-275 556 Div. 10, 20
(TISTM/EJH) OTS price $10.10

Aerojet-General Nucleonics, San Ramon, Calif.
HYDRAZINE PROCESS DEVELOPMENT.
Interim technical engineering rept. no. 4, Feb-Apr 62,
by R. I. Miller, R. L. Pearson and others.
May 62, 109p. incl. illus. tables, 13 refs.
(Rept. no. AN-584)
(Contract AF 33(600)42996)
(ASD TR 7-840A, vol. 5) Unclassified report

DESCRIPTORS: *Hydrazines, Production, Industrial production, Industrial equipment, Homogeneous reactors, Production reactors, Atomic energy engineering, Fission products, Chemical reactions, Chemical analysis, Chromatographic analysis, Spectrographic analysis, Ammonia, Uranium compounds, Dioxides.

Development of a continuous, in-reactor, hydrazine production loop based on the fissio-chemical process approach is reported. Particulate fuel behavior in hydroclones, in filters, and in a flocculating environment is described. Alterations of the in-reactor loop, supporting components, and instrumentation, necessitated by a change in reactor facility are discussed. Equipment to be used for NH3 radiolysis, and for high energy compound and slurry radiation stability studies, are described. All process development support systems are fully operational. Hydroclone tests showed up to 98% solids removal from a water-UO2 slurry. UO2 floc size in NH3 decreased with increasing temperature, but was unaffected by N2H4 addition. Toroid tests indicate that no severe erosion problems should occur in loop operation. Equipment and techniques for a UO2-NH3 slurry irradiation were developed. The materials loop was modified for component tests and fuel stability experiments. Design of the fission gas-trapping system was begun. A preliminary theoretical analysis of fission fragment range-energy relationships was completed. Stirred capsule irradiation continued to show erratic product yield. Pressure drop tests were performed on filter elements. (Author)

AD-275 642 Div. 10
(TISTM/TCG) OTS price $3.60

Louvain U. (Belgium).
CONTRIBUTION TO THE PROBLEM OF FLAME INHIBITION.
Final technical rept. no. 4, 1 Apr 61-31 Mar 62,
by A. Van Tiggelen. Apr 62, 32p. incl. illus. tables, 12 refs.
(Contract DA 91-591-EUC-1702)
Unclassified report

DESCRIPTORS: *Flames, *Methanes, *Oxygen, *Flame propagation, Mixtures, Nitrogen, Oxidation inhibitors, Aluminum compounds, Silicon compounds, Oxides, Power metals, Measurement, Inhibition, Free radicals, Electrostatic generator, Theory.

A theoretical interpretation of the existence of both upper and lower flammability limits is presented. This interpretation is based on the fundamental condition that at these limits the chain termination has a probability which equals the probability of chain branching. The most important parameter appearing in the final equation seems to be the activation energy of the chain propagation steps. If inhibitors affect the flammability limits it would be because of a modification of this activation energy. The theory presented is compared with experimental data obtained with methane-oxygen mixtures. Upper and lower flammability limits were measured at different degrees of dilution with N and different initial temperatures up to about 400 C. The phenomenon of flame inhibition by means of finely divided powders is discussed. A special device was constructed to maintain a constant amount of dust in any given flow of a flammable mixture burning on top of a conventional burner. Two possible theoretical interpretations of experimental data are presented. More measurements will be needed to decide which model fits best with the experimental facts. (Author)

AD-275 804 Div. 10, 27, 12
(TISTA/SEB) OTS price $13.00

Bell Aerosystems Co., Buffalo, N. Y.
TITAN II STORABLE PROPELLANT HANDBOOK.
Final handbook, rev. A,
by Ralph R. Liberto. Mar 62, 188p. incl. illus. tables, 62 refs. (Rept. no. 8182-933004; Rev. A to AD-260 333)
(Contract AF 04(694)72)
(AFBSD TR 62-2, Rev. A to AFFTC TR 61-32)
Unclassified report

DESCRIPTORS: Guided missiles, Surface to surface, Booster rockets, *Liquid rocket propellants, Nitrogen compounds, *Tetroxides, *Hydrazines, Methyl hydrazines, Physical properties, Handling, Detonation, Explosions, Hazards, Storage, Cleaning of Propellant tanks, Handbooks.

Summarized are the physical properties, materials compatibility, handling techniques, flammability and explosivity hazards, and procedures for storing, cleaning, and flushing of the Titan II propellants, N2O4 as the oxidizer and a nominal 50/50 blend of UDMH and N2H4 as the fuel. The data was derived both from a literature survey and from a test program conducted at Bell Aerosystems Company and at the U. S. Bureau of Mines. (Author)

AD-275 805 Div. 10, 27
(TISTA/SEB) OTS price $5.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
STUDY OF A TRACER METHOD FOR SOLID PROPELLANTS. SPECTROSCOPIC DETECTION OF TRACER ELEMENTS IN SOLID PROPELLANT ROCKET EXHAUSTS.
Summary rept., 24 May 60-20 May 61, on Energy Transfer Research,
by W. Stark and B. Hornstein. Feb 62, 52p. incl. illus. tables, 3 refs.
(Contract AF 29(600)2422; Continuation of Contract AF 29(600)2067, Proj. 3827)
(AFOSR/DRA 62-6) Unclassified report

DESCRIPTORS: *Solid rocket propellants, Propellant grains, Combustion, Test methods for Exhaust flames, *Exhaust gases, Spectrographic analysis, Thermal radiation, Detection, Measurement, Tests, Test equipment, Pressure, Lithium compounds.

The feasibility of a spectroscopic method for detection of tracer elements in the exhaust flames of solid propellant rocket engines was

investigated. This technique has the possibility of being used to determine burning rates and characteristics of solid propellant grains in operating motors. This is done by relating time of appearance of specific emitted radiation in the exhaust flame with the original position of corresponding tracer salts previously incorporated within the grain. Spectrograph modification and protective measures were required for field monitoring of tracer emission in rocket exhausts of engines operating in an outdoor test installation. Suitable tracers were incorporated into solid propellant grains of two compositions--one aluminized to obtain high flame temperatures and background continuum radiation, the other without aluminum to provide lower temperatures and no background. Feasibility of the method was demonstrated with the detection of tracer emission from the aluminized propellant against the background radiation. (Author)

AD-275 845 Div. 10
(TISTA/GEC) OTS price $2.60

Technische Hochschule, Vienna (Austria).
CONDUCT THEORETICAL AND EXPERIMENTAL INVESTIGATIONS ON THE AERODYNAMICS OF THE MIXING OF COOLING AIR WITH COMBUSTION PRODUCTS IN A COMBUSTION CHAMBER.
Final technical rept., 1 Nov 61-31 Jan 62 on Research on Gas Turbine Combustion Chamber.
28 Feb 62, 24p. incl. illus.
(Contract AF 61(052)569)
(AFOSR-2667) Unclassified report

DESCRIPTORS: Combustion chamber gases, *Combustion, *Stabilization, Jet mixing flow, Cooling, Aerodynamics, Turbulent flow, Effectiveness, Combustion chamber liners, Thermal insulation, Temperature, Pressure, Air, Combustion chambers.

Theoretical and experimental investigations were made of the aerodynamics of the mixing of cooling air with combustion products in a combustion chamber. The difference between the isolated and unisolated combustion chamber was determined. The turbulence combustion chamber attained very high degrees of efficiency both in an insulated and non-insulated state and the temperature distribution at the exhaust-end of the combustion chamber was uniform in both cases, particularly so when slight tertiary air quantities were injected against the main flow. (Author)

AD-275 876 Div. 10, 22
(TISTW/EET) OTS price $1.60

Bureau of Mines, Pittsburgh, Pa.
INITIATION OF DETONATION RESULTING FROM COMBUSTION INSTABILITIES.
Quarterly rept., 1 Feb-30 Apr 62,
by F. C. Gibson, C. R. Summers, and F. H. Scott.
23 May 62, 8p. illus.
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Explosives, *Detonation, Propellants, Detonation waves, Ignition, Combustion, High speed photography, Instrumentation, Shock waves, Sensitivity, Velocity, Stability.

A continuation of research conducted on deflagration to detonation in propellants and explosives is presented. Initiation mechanisms and the role of cavitation on the propagation of detonation are emphasized Simultaneous use of both high-speed photographic and electronic instrumentation is being made to facilitate interpretation of events preceding and during development of detonation in high explosives and propellants. Additionally, detonability studies are made on new high energy propellants as they become available. They are produced in very limited quantities and must be evaluated in small scale tests using combined instrumentation techniques; results of such studies are compared to common high-explosive behavior under similar conditions. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-275 858 Div. 11, 22
(TISTE/CAM) OTS price $4.60

Ordnance Tank-Automotive Command, Detroit, Mich.
AN ANALYSIS OF THE DRAWBAR PULL VS SLIP RELATIONSHIP FOR TRACK LAYING VEHICLES,
by Zoltan Janosi and Ben Hanamoto. Nov 61,
39p. incl. illus. tables, 11 refs. (Rept. no. RR 47)
(Proj. 570-05-001)
Unclassified report

DESCRIPTORS: *Tracked vehicles, Tractors, Tanks, Vehicle tracks, Soils, Stresses, Deformation, Pressure, Analysis, Theory, Mathematical prediction, Earth models, Model tests, Test equipment, Test methods, Trafficability.

Equations are deduced by means of the Land Locomotion Soil Value System and a soil shear stress-strain relationship to predict the drawbar pull of track laying vehicles as a function of slippage. Test results indicating reasonable accuracy of the method are presented. Conclusions are drawn concerning possible means of achieving improved tracked vehicle design, and the direction of future research. (Author)

12. GUIDED MISSILES

AD-275 437 Div. 12, 9, 22
(TISTA/WAW) OTS price $12.00

Advanced Technology Corp. Santa Barbara, Calif.
THE DYNAMICS OF SPINNING BODIES AT LARGE ANGLE OF ATTACK,
by J. E. Brunk, W. L. Davidson, and R. W. Rakestraw. Jan 62, 170p. incl. illus. tables, 20 refs.
(Contract AF 29(600)2936, Proj. 7856)
(AFOSR/DRA 62-3) Unclassified report

DESCRIPTORS: *Guided missiles, *Rockets, Bodies of revolution, *Cylindrical bodies, *Conical bodies, Drag, *Spin, Recovery, Stability, *Dynamics, Aerodynamics, Guided missile trajectories, Rocket trajectories, Mathematical analysis, Vector analysis, Differential equations, Drag, Deceleration.

A theoretical study was conducted to determine the motion of nonstabilized rolling and spinning bodies at very large angles of attack. From numerical integration of the non-linear six-degrees-of-freedom equations of motion it was found that a rolling cone-cylinder body could achieve a self-sustained spinning motion for large ranges of both center-of-gravity position and Reynolds number. The stability of the autorotative motion was investigated using linear theory. For configurations representative of current small missiles descent velocities as low as approximately 100 ft/sec were achieved with spinning motion. Stable spins could be initiated from small angle of attack either by supplying a pitch impulse or effecting aerodynamic destabilization. (Author)

AD-275 456 Div. 12
(TISTW/RD) OTS price $2.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS. PART P. EFFECTS OF RANDOM THRUST.
Rept. on Dynamics of Missile Launchers,
by D. Penrod. Apr 62, 13p. incl. illus. (Technical rept. no. 216)
(Contract DA 11-070-508-ORD-593)
Unclassified report

DESCRIPTORS: *Guided missile launchers, Dynamics, Thrust, Information theory, Oscillation, Mathematical analysis, Guided missiles.

An analysis is presented of the statistical variation of the tip-off angle and angular velocity of a missile due to fluctuations in the thrust force. The single degree of freedom launcher model is employed, and the thrust function is assumed to be the sum of two functions, one of which is of constant form from launch to launch, and the other representing the random time-dependent fluctuations. Under these assumptions two variations in tip-off conditions are present, one due to the change from launch to launch in average value of thrust, and a second due to rapid time-dependent variations. Expressions are derived for the mean values and variances of the tip-off angle and velocity using some techniques of information theory. (Author)

AD-275 463 Div. 12, 9, 27
(TISTA/SEB) OTS price $5.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
SECONDARY GAS INJECTION IN A CONICAL ROCKET NOZZLE. I. EFFECT OF ORIFICE DIAMETER AND MOLECULAR WEIGHT OF INJECTANT,
by R. E. Walker, A. R. Stone, and M. Shandor. Feb 62, 44p. incl. illus. tables, 25 refs.
(Rept. no. CM-1010)
(Contract NOrd-7386)
Unclassified report

DESCRIPTORS: *Thrust, Control, Injection, Gases, Rocket motor nozzles, Conical nozzles, Injectors, Orifices, Pressure, Molecular weight, Specific heat, Effectiveness, Carbon dioxide, Nitrogen, Argon, Helium, Hydrogen, Tests, Mathematical analysis, Exhaust gases, Specific impulse, *Control systems.

Data are presented on interference forces resulting when a gas at ambient temperature is laterally injected through a single circular orifice in the conical portion of a rocket nozzle into hot supersonic propellent gases. Variables examined are injectant orifice size and associated pressure ratio change and effect of injectant molecular weight and specific heat ratio. Other parameters remain essentially constant during these tests. Simple theoretical arguments can predict relative effects of intrinsic injectant properties, but pressure ratio effects are not adequately described. Effectiveness of secondary injection depends on injectant orifice size, which was not treated in any theoretical models. (Author)

AD-275 587 Div. 12
(TISTB/AW) OTS price $1.25

Lockheed Aircraft Corp., Sunnyvale, Calif.
NONDESTRUCTIVE TESTING OF FILAMENT-WOUND ROCKET CASES: AN ANNOTATED BIBLIOGRAPHY,
comp. by George E. Owens. Feb 62, 40p. 89 refs.
(Special bibliography no. SB-62-3; Rept. no. 3-80-62-4)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: *Bibliography, *Rocket cases, *Wire, *Filament wound construction, *Glass textiles, Laminates, Plastics, Honeycomb cores, Sandwich construction, Thermal insulation, Thermal stresses, Moisture, Non-destructive testing.

The recent literature was searched for information relating to nondestructive testing of rocket motor cases. The search was limited to structures wound from wire and from filaments of glass fiber-resin composites. The 89 references are arranged alphabetically by author. Indexes of secondary authors and of corporate sources or sponsors are appended. The principal sources searched, in addition to the report holdings of the LMSC Technical Information Center, included the following: ASTIA ''Technical Abstract Bulletin'' (1960-1961); ''Materials Research and Standards'' (1961); ''Nondestructive Testing'' (1959-1961); ''Reports of NRL Progress'' (1961); and Solid Propellant Information Agency ''current Abstracts'' (1959-1961). (Author)

Division 12 - GUIDED MISSILES

AD-275 593 Div. 12, 2
(TISTP/MFA) OTS price $6.60

Paris U. (France).
DOPPLER EFFECT OF ARTIFICIAL SATELLITES.
Final rept.,
by J. Mass and E. Vassy. 31 Dec 61, 39p. illus. table, 41 refs.
(Contract AF 61(514)1141)
(AFCRL 62-93) Unclassified report

DESCRIPTORS: *Doppler systems, *Satellite vehicles, Tracking, *Relativity theory, Radio signals, Frequency, Measurement, Electromagnetic waves, Earth, Gravity, Satellite vehicle trajectories, Solar systems, Orbital flight paths, Ionosphere, Transformations (Mathematics), Gas ionization, Refraction, Counting methods.

The Doppler effect measured on satellites and space-probes, which consists of frequency measurements only, is attractive for many purposes. It was found for instance that in principle a Doppler-frequency curve (frequency function of time) of a single pass of a satellite should suffice to measure its orbital parameters, and that accurate tracking of objects within the solar system using only the Doppler-effect was possible within the present state of the art. The emissions of satellites are used to facilitate navigation on the surface of the earth by accurate frequency measurements of their Doppler-shift, assuming that their orbits are accurately known. This is the inverse procedure of calculating the orbit parameters from the Doppler-shift, and known position of receiver. The distortions of the Doppler curve introduced by ionospheric effects, like refraction and change of phase velocity, are a disadvantage for tracking and navigation but they enable one to take some interesting measurements of the ionosphere like total electron contents, and heterogenity of the ionized layers. Important published results concerning the measurement and utilization of the Doppler-shift from artificial satellites are reviewed. (Author)

AD-275 745 Div. 12, 8
(TISTB/AW) OTS price $6.60

Air Force Systems Command, Washington, D. C.
QUARTERLY INDEX AND ABSTRACTS OF TECHNICAL DOCUMENTARY REPORTS.
Quarterly rept. no. 1.
1962, 57p.
Unclassified report

DESCRIPTORS: *Bibliography, *Air force research, *Rocket motors, *Wind tunnels, Aeronautics, Guided missiles, Weapons, Blunt bodies, Electronic systems, Parachutes, Reentry aerodynamics, Antennas, Masers.

AD-275 767 Div. 12
(TISTB/LH) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
WIND-INDUCED OSCILLATIONS AND OTHER LOADS ON SPACE VEHICLES FASTENED VERTICALLY TO LAUNCHING PADS: AN ANNOTATED BIBLIOGRAPHY,
comp. by Eugene E. Graziano. Feb 62, 25p.
76 refs. (Special bibliography no. SB-61-61; Rept. no. 3-80-61-37)
Unclassified report

DESCRIPTORS: *Bibliography, *Spaceships, *Launching sites, Wind, Damage control, Oscillation, Pressure, Vibration, Damping, Measurement, Reynolds number, Wake.

Space vehicles fastened to their launching pads are vulnerable to damage by wind induced oscillations caused by vortex shedding. At supercritical Reynolds numbers vertex shedding is aperiodic. This can cause large bending moments. The reliable prediction of damaging wind loads on guided missiles in vertical positions on the ground requires experimental data taken at very high Reynolds numbers; this data does not exist. Items were selected for inclusion on the basis of whether they were of importance for background, timeliness, direct application, or close relation, and as to whether an item might be a key to related literature. (Author)

AD-275 775 Div. 12
(TISTB/LH) OTS price $4.60

Naval Missile and Astronautics Center, Point Mugu, Calif.
INDEX OF TECHNICAL REPORTS PUBLISHED BY PMR AND NMC 1960 AND 1961,
by C. L. Hopkins. 24 May 62, 44p. (Technical rept. no. NMC TR 62-2)
Unclassified report

DESCRIPTORS: *Indexes, *Scientific reports, *Guided missiles, Aircraft, Communication systems, Detection, Astronautics, Radar equipment, Operations research, Naval research, Military publications.

AD-275 781 Div. 12, 8
(TISTW/RD) OTS price $26.00

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
IMPLEMENTING RELIABILITY CONTROL. 5TH NAVY-INDUSTRY CONFERENCE ON MATERIAL RELIABILITY, 1-2 NOVEMBER 1961, MAYFLOWER HOTEL, WASHINGTON, D. C.
1961, 548p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Reliability, *Symposia, *Naval equipment, Guided missiles, Air to surface, Underwater to surface, Surface to air, Materials, Maintenance, Jet bombers, Aircraft, Quality control, Weapons, Naval aircraft, Aircraft equipment, Management engineering.

AD-275 856 Div. 12, 22, 7
(TISTE/NTM) OTS price $2.60

Amphenol-Borg Electronics Corp., Chicago, Ill.
DEVELOPMENT OF A TWO-CONDUCTOR SHIELDED CABLE CONNECTOR FOR USE IN MISSILE FIRING CIRCUITS.
Quarterly technical progress rept. no. 3, 28 Dec 61-28 Mar 62,
by William J. Mashek. 28 Mar 62, 21p. incl. illus. 2 refs. (Rept. no. 1-173)
(Contract N178-7933)
Unclassified report

DESCRIPTORS: *Electric connectors, *Electric cables, *Firing circuits, *Electromagnetic shielding, *Guided missile launchers, Radio-frequency attenuators, Electromagnetic waves, Attenuation, Soldered joints, Shielding, Effectiveness, Test methods, Test equipment, Guided missiles, Hazards.

Research continued on the development of a two-conductor shielded cable connector suitable for use in missile firing circuits. Design principles to be developed will be used by the Navy in a new

family of electrical connectors. These connectors will exhibit highly effective shielding characteristics to electromagnetic radiation and thereby will reduce the hazards of such radiation to electrically detonated ordnance. Efforts concern the following subjects: construction of connector test sample for use in evaluation of connector shielding effectiveness; design study of various shielding contact configuration and methods for joining same to the connector shell; a shielding effectiveness test program; and construction of special test equipment to facilitate shielding effectiveness testing. (Author)

AD-275 893 Div. 12
(TISTW/EET) OTS price $1.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION TYPE X PYLON/GAM-83 COMPATIBILITY.
Final rept.,
by R. C. Allen and J. N. Portis. Apr 62, 13p. incl. illus. (Rept. no. TAC TR 61-25)
Unclassified report

DESCRIPTORS: *Guided missile launchers, Guided missiles, Air to surface, Launching, Fighter bombers, Airplane protuberances, Adapters, Airborne, Flight testing.

Tests were conducted to evaluate the compatibility of the Type X Pylon with the GAM-83A and TGAM-83 missiles. Results of the test showed the Type X Pylon to be satisfactory for both GAM-83A and TGAM-83 carriage and launch. The Type X also proved to be superior to the Type I Mod II Pylon with adapter that is currently being used. The most significant improvements were in the airborne handling characteristics of the aircraft and an increase in operational limitations with an asymmetrical Type X Pylon configuration. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-275 474 Div. 13, 25
(TISTM/BRW) OTS price $13.50

Massachusetts Inst. of Tech., Cambridge.
THE DYNAMIC BEHAVIOR OF REINFORCED CONCRETE COLUMNS, PART II,
by Cheng Y. Yang, C. N. Tang and others. Mar 62, 182p. incl. illus. tables, 18 refs. (Research rept. no. R62-5)
(Contract DA 49-146-XZ-015)
(DASA-1260) Unclassified report

DESCRIPTORS: *Beams, *Reinforced concrete, Concrete, Steel, Reinforcing steel, Stresses, Deformation, Elasticity, Plasticity, Theory, Measurements, Mathematical analysis, Load distribution, Mechanical properties, Physical properties, Design, Mechanics, Dynamics, Tests, Test equipment, Test methods.

A theoretical investigation was made of concentrically loaded, eccentrically loaded, ultimate material strength and buckling of reinforced concrete columns. Additional experiments were performed on 77 columns of which 39 were eccentrically loaded short columns with length/depth ratio of 7, 12 columns were eccentrically loaded long columns with length/depth ratios of 15 and 25, and 26 columns were concentrically loaded long columns with length/depth ratios of 15 and 25. A comparison was made of ultimate dynamic loads of test columns to the corresponding predicted values from modified ACI formulas. For concentrically loaded columns, a comparison was made of ultimate dynamic loads of tested columns to the corresponding predicted values from the presently developed methods for both ultimate material strength and buckling. (Author)

14. MATERIALS (NON-METALLIC)

AD-275 361 Div. 14, 25
(TISTM/BRW) OTS price $.75

Armour Research Foundation, Chicago, Ill.
MECHANISM OF WEAR OF NONMETALLIC MATERIALS.
Interim rept., Jan-Dec 60 on Surface and Interface Phenomena of Matter,
by C. H. Riesz and H. S. Weber. Feb 62, 23p. incl. illus. tables, 24 refs.
(Contract AF 33(616)6920, Proj. 7022)
(WADC TR 59-316, Pt. 3)
Unclassified report

DESCRIPTORS: *Friction, Single crystals, *Sapphires, *Surfaces, Deformation, Lattices, Films, Oxides, Test equipment, Vacuum apparatus, Measurement, Aluminum compounds, Abrasion, Bonding, Tests, Cleaning, Surface properties, Crystal structures, Fracture (Mechanics), Electron microscopy, Degasification.

Friction and wear of single-crystal sapphire sliding under 0.001 mm Hg vacuum from 30 to 1550 C were studied. Surface cleanliness was of prime importance. High coefficients of friction and stick-slip sliding occurred at and below 300 C. From 300 to 1000 C lower coefficients and smooth sliding occurred. Above 1000 C high stick-slip appeared, but at 1350 and 1550 C less stick-slip and lower coefficients dominated. Chevron-shaped subsurface fractures of the sapphire plate were observed in the wake of the sapphire slider at and below 300 C. Their formation was orientation dependent and occurred when the C sub o -axis of the plate was inclined 86 to 89 degrees to the surface, opposite to the direction of sliding. In the absence of fracture, extension adhesions were noted. The fractures were 2 to 5 mu deep at the apex, and the arms extended 50 to 80 mu at an approximate right angle. The fractures were 7 to 10 mu apart and the V's pointed opposite the direction of sliding. Under high vacuum a weld-adhesion mechanism of sliding friction seems useful, especially above 1000 C. Below 300 C it may be valid only if clean surfaces are in sliding contact. (Author)

AD-275 401 Div. 14, 8
(TISTM/GEC) OTS price $14.50

Air Force Cambridge Research Labs., Bedford, Mass.
ELECTRONIC MATERIAL SCIENCES LABORATORY.

Status rept. no. 5.
3 Jan 62, 207p. incl. illus. tables (Rept. no. AFCRL 62-10)
Unclassified report

DESCRIPTORS: *Electronics, Electronic equipment, Electron tubes, Materials, *Scientific research, *Radiochemistry, *Solid state physics, *Plasma physics, Theqry, Thermoelectricity, High temperature research, High pressure research, Semiconductors, Crystals, Single crystals, Crystal structure, Thin films, Bibliography.

AD-275 432 Div. 14, 4
(TISTM/REB) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF THERMALLY STABLE SILICON-CONTAINING ADHESIVES,
by Marjorie C. St. Cyr and William C. Tanner.
Feb 62, 20p. incl. illus. 14 refs. (Technical rept. no. FRL-TR-60)
(DA Proj. no. 5B93-32-008)
Unclassified report

DESCRIPTORS: *Adhesives, Silicon, *Silicones, High temperature research, Stability, Synthesis, Polymers, *Silanes, Phenols, Methyl radicals, *Silicone resins, Phenyl radicals.

An investigation was made of arylene silane/siloxanes and metalloxane polymers as base resins for thermally stable adhesive systems. As initial objective, arylsilanes, and disilylarylenes are synthesized to study techniques of attaching reactive polar groups to silicon-containing monomers. Monomers containing reactive polar sites will be polymerized, in bulk or in situ and evaluated for their ability to function as adhesives from -54 C up to their maximum usable temperature. The synthesis of Si-containing polymers with reactive functional groups for use as adhesives appears practicable; but the direct synthesis of material containing functional groups attached to Si does not appear feasible at this time. (Author)

AD-275 501 Div. 14, 4
(TISTM/JSM) OTS price $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
SYNTHESIS OF ORGANOMETALLIC POLYMERS.
Progress rept. no. 6, 1 July-31 Dec 61,
by A. D. Delman, R. J. Katzenstein, and A. E. Ruff. 8 May 62, 15p. 25 refs. (Lab Proj. 6135)
Unclassified report

DESCRIPTORS: *Silicones, *Heat resistant polymers, *Metalorganic compounds, Polymers, Elastomers, Phenyl radicals, Silicon compounds, Hydroxides, Alcohols, Aluminum compounds, Chlorides, Tin compounds, Molecular structure, Chemical bonds, Synthesis.

In connection with a program to synthesize new siloxane polymers with superior resistance to attack by heat, studies were undertaken to determine the molecular structure of a thermally resistant resinous product obtained from Ph3SiOH and AlCl3, which showed a weight loss of only 9% when heated to 500 C at a rate of 180 C/hr. Efforts were also made to obtain information about the reaction mechanism. Results indicate that the material is probably a branched open-chain silicone polymer with attached cyclic siloxane trimer groups. Such materials are more thermally stable than siloxanes with only open-chain or non-cyclic branched molecular configurations. When the polymer is crosslinked through phenyl-silicon bond cleavage and transfer reactions, the thermal resistance is markedly reduced. The course of the catalytic polymer reaction involves a partial scission of the phenyl groups bonded to the central Si atom, accompanied by a redistribution of groups, to form siloxane polymers of branched structure with attached cyclic trimer units. Exploratory studies were initiated to synthesize open-chain copolymers with SiO and M-O backbone units and branches consisting of Si-O and M-O cyclic trimer groups. Under similar catalysis conditions, Ph3SnOH is disproportionated to give (Ph2SnO)n and Ph4Sn. (Author)

AD-275 536 Div. 14, 17
(TISTM/BRW) OTS price $3.50

Southern Research Inst., Birmingham, Ala.
THE THERMAL PROPERTIES OF THIRTEEN SOLID MATERIALS TO 5000 DEGREES F FOR THEIR DESTRUCTION TEMPERATURES.
Rept. for 15 Mar 59-14 Nov 60 on Chemistry and Physics Materials,
by David S. Neel, C. D. Pears, and Sabert Oglesby, Jr. Feb 62, 201p. incl. illus. tables.
(Contract AF 33(616)6312, Proj. 7360)
(WADD TR 60-924) Unclassified report

DESCRIPTORS: *Refractory materials, High temperature research, Physical properties, Heat transfer, Specific heat, Thermal conductivity, Thermal expansion, Melting, Pyrolysis, Deterioration, Graphite, Tungsten, Borides, Nitrides, Carbides, Silicates, Enthalpy, Laboratory furnaces, Aluminum compounds, Oxides, Sapphires, Iron, Nickel, Hafnium compounds, Niobium compounds, Tantalum compounds, Titanium compounds, Silicon compounds, Zirconium compounds, Ceramic materials, Metals.

The heat capacity, thermal expansion, and thermal conductivity were measured for 13 refractory materials, including ATJ graphite, W, four nitrides, two borides, a silicate, and four carbides. The temperature range was from 500 to 5000 F. The heat capacity varied considerably with temperature and demonstrated marked inflections at specific temperature ranges. The thermal expansion parallel with the press direction was in the range of 3 x 10 to the -6th power in./in./degree F and varied significantly with the prior thermal history of the specimen. Most of the materials failed below the handbook values for their melting or deterioration temperatures. (Author)

AD-275 571 Div. 14, 25
(TISTM/TCG) OTS price $2.25

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
INVESTIGATION OF REFRACTORY COMPOUNDS AS THERMIONIC EMITTERS.
Final rept.,
by Robert Steinitz and Leonard Berenbaum.
30 Apr 62, 81p. incl. illus. tables, 39 refs.
(Rept. no. TR 62-10.4)
(Contract Nonr-346300)
Unclassified report

DESCRIPTORS: *Refractory materials, *Zirconium compounds, Oxides, *Thermionic emission, *Tungsten, Crystals, *Carbides, Powder metals, Sintering, Melting, Preparation, Manufacturing methods, Purification, Temperature, Stability, Thermodynamics, Thermal expansion, Lattices, Spectrographic analysis, Test equipment.

The production of ZrC emitters with a total

metallic impurity content less than 350 ppm and interstitial impurities less than 1000 ppm O and 100 ppm N was accomplished. The combined C content of the best material was 11.5% as compared with a stoichiometric content of 11.62%. The lattice parameter of this material was above 4.698 Angstroms, which is close to the highest value, 4.702 Angstroms, characteristic of high purity, ever reported for this material. A deposit occurred at the cold collector surface after four hr at 1900 C, even though the emitter had previously been outgassed at high vacuum; and the emission current was erratic at temperatures as low as 1000 C after this treatment. The deposit on the collector contained Cu, Fe, Al, Mg and Zr, as shown by mass spectrographic and emission spectrographic analyses. These metallic impurities can have an influence on the behavior of the emitter, and may be responsible in part for the unstable emission currents. (Author)

AD-275 643 Div. 14, 25
(TISTP/WH) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
NON-LINEAR EFFECTS OF TEMPERATURE VARIATION IN STRESS ANALYSIS OF ISOTHERMALLY LINEAR VISCO-ELASTIC MATERIALS,
by E. H. Lee and T. G. Rogers. May 62, 32p. incl. illus. tables, 8 refs. (Technical rept. no. 3)
(Contract Nonr-56230, Proj. NR 064-450)
Unclassified report

DESCRIPTORS: Temperature, *Stresses, *Elasticity, *Viscosity, Plastics, *Polymers, Deformation, Nonlinear systems.

The form of the equations for viscoelastic stress analysis including the influence of temperature variation is discussed. Thermo-rheologically simple material behavior is assumed, for which temperature change produces a non-linear translation of viscoelastic characteristic functions and spectra on a log-time or log-frequency plot. The advantages and disadvantages of utilizing a reduced time variable in place of real time are assessed. The equations for spherically symmetrical thermal stress fields in a solid sphere or spherical shell are presented, and expressed in the form of Volterra integral equations for the radial stress gradient. A method of numerical treatment of these for various boundary value problems with fixed or moving boundaries is presented. As particular examples the thermal stresses in spheres of polymethyl-methaccrylate are computed, when ablation of the surface at constant temperature occurs. (Author)

AD-275 736 Div. 14, 25
(TISTM/EJH) OTS price $23.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MATERIALS IN RADIO ELECTRONICS (Materialy V Radioelektronike),
by N. P. Bogoroditskiy and V. V. Pasynkov.
30 Jan 62, 472p. incl. illus. tables, 25 refs.
(Trans. no. FTD-TT-61-101 of Gosudarstvennoye Energeticheskoye Izdatel'stvo, Moskva, Leningrad; pp. 1-352, 1961)
Unclassified report

DESCRIPTORS: *Dielectrics, *Conductors, *Semiconductors, *Magnetic materials, Ferromagnetic materials, Ferrites, Radio equipment, Electronic equipment, Solid state physics, Dielectric properties, Electrical properties, Mechanical properties, Physical properties, Materials, Ceramic materials, Plastics, Rubber.

This book sets forth the physics of phenomena occurring in insulating, semiconducting, conducting, and magnetic materials employed in radio engineering, and describes their electrical properties, particularly at elevated and high frequencies, and also presents their physical-chemical and mechanical characteristics. A brief examination is made of the production procedures involved in the manufacture of many materials employed in the radio engineering industry, and the manufacture therefrom of parts and products employed in radio electronics. The book is designed as a text for students in colleges of radio engineering and in the radio engineering, electrophysics, and electronic engineering departments of other higher educational institutions. It may be of value to engineers working in radio electronics. (Author)

AD-275 789 Div. 14, 8
(TISTM/BRW) OTS price $2.60

Synthetic Mica Co., West Caldwell, N. J.
ULTRA HIGH TEMPERATURE DIELECTRIC EMBEDDING MATERIALS.
Quarterly progress rept. no. 2, 28 Jan-27 Apr 62, by F. A. Barr and S. Rodney. 27 Apr 62, 23p. incl. illus. tables, 7 refs.
(Contract NObs-86219; Continuation of Contract NObs-78714, Proj. R-007-04-01)
Unclassified report

DESCRIPTORS: *Embedding substances, *Encapsulation, *Mica, Aluminum compounds, *Phosphates, Ceramic coatings, Glass, Electric insulation, High temperature research, Dielectrics, Electronic equipment, Processing, Manufacturing methods, Glass seals, Dielectric properties, Electrical properties, Physical properties, Ceramic materials.

A fluidized-bed technique for coating synthetic mica-phosphate embedding compound with devitrified glass was successfully developed. Samples of the devitrified glass coated embedding compound had satisfactory power factor and dielectric constant values at relative humidities of 50 and 100%. Water absorption values of such samples were also determined to be less than 0.5%. Methods of preventing reduction of the lead borate type devitrified glass were determined with NH_4NO_3 as an oxidizing agent. (Author)

AD-275 860 Div. 14, 31
(TISTM/EJH) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
DESIGN AND DEVELOPMENT OF IMPROVED RESIN SYSTEMS FOR FILAMENT-WOUND PRESSURE HULL STRUCTURES.
Informal progress rept. no. 1, 1 Jan-31 Mar 62. 8 May 62, 15p. incl. illus. table (Rept. no. 0611-01-1)
(Contract NObs-86307)
Unclassified report

DESCRIPTORS: *Filament wound construction, Underwater, *Ship hulls, *Composite materials, *Epoxy resins, *Resins, Reinforcing materials, Synthetic fibers, *Glass textiles, *Laminates, Binders, Mechanical properties, Hydrostatic pressure, Loading, Test methods, Elasticity, Tensile properties, *Pressure vessels.

A discussion of the program and an outline of the work is given. The program will investigate various problems associated with the use of organic resins and binders for fiberglass in pressure hull structures. The compressive yield strength and modulus of a representative epoxy resin system averaged 17,430 ± 500 psi for 15 specimens. Work was initiated on a plate glass adhesion test. Twenty-three resin systems were cast and are being prepared for testing. (Author)

15. MATHEMATICS

AD-275 350 Div. 15
(TISTP/TL) OTS price $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON THE STABILITY OF FINITE DIFFERENCE APPROXIMATIONS TO SECOND ORDER LINEAR PARABOLIC DIFFERENTIAL EQUATIONS,
by D. G. Aronson. 5 Apr 62, 19p. 6 refs. (Technical rept. no. 106)
(Contract Nonr-22511, Proj. NR-041-086)
Unclassified report

DESCRIPTORS: *Partial differential equations, Functions, Stability, *Difference equations, *Differential equations, Operators (Mathematics), Lattices.

Explicit finite difference approximations to the initial value problem for a second order linear parabolic differential equation with variable coefficients in two independent variables are considered. Essentially, our problem is to determine conditions which will guarantee that the approximating difference problem is well-posed. Since we deal with explicit difference equations the existence of a unique solution of the difference problem is trivial. Thus our main concern is the dependence of the solution of the difference problem on its data. Roughly speaking, a difference problem is said to be stable if its solution depends continuously on the data, uniformly for all sufficiently fine lattices of mesh points. (Author)

AD-275 351 Div. 15
(TISTP/TL) OTS price $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
CONSTRUCTION OF CERTAIN EXTREMAL PROPERTIES ON MULTIPLY CONNECTED DOMAINS BY VARIATIONAL TECHNIQUES,
by Don B. Davis. 23 Apr 62, 35p. 3 refs. (Technical rept. no. 107)
(Contract Nonr-22511, Proj. NR-041-086)
Unclassified report

DESCRIPTORS: *Topology, *Conformal mapping, *Combinatorial analysis, *Complex variables, Transformations (Mathematics), Sequences, *Differential equations, Operators (Mathematics), Partial differential equations, Functions, Inequalities, Harmonic analysis, Electrostatics, Potential theory, Statistical distributions.

AD-275 352 Div. 15
(TISTP/TL) OTS price $9.60

Stanford Research Inst., Menlo Park, Calif.
AN APPLICATION OF INTEGRAL GEOMETRY OF PATTERN RECOGNITION.
Final rept.,
by G. H. Ball. Feb 62, 109p. incl. illus. tables, 20 refs.
(Contract Nonr-343800)
Unclassified report

DESCRIPTORS: *Integral equations, *Geometry, Groups (Mathematics), *Transformations (Mathematics), Integration, Probability, Errors, *Theory, *Statistical analysis, Numerical analysis, Statistical distributions, Rotation, Translations, Real variables, Statistical functions.

A machine for recognizing patterns may be considered to consist of two principal parts--a receptor and a categorizer. The receptor views the pattern and translates its features into machine language. The categorizer classifies the pattern using the information supplied to it by the receptor. In this paper information extracted from a visual pattern by receptor is required to be invariant with respect to the rotation and the translation (and at times, scale changes) of the pattern. We thereby obtain numerical parameters from the pattern that corresponds to the shape of the pattern. Integral geometry is employed to obtain these invariant parameters. Probabilities of error are found as a function of the number of pattern measurements which are used to estimate a parameter. The numerical values of some parameters are obtained for the set of patterns consisting of circles, squares, rectangles, ellipses and right isosceles triangles. In addition, decision theory is used to obtain the structure of the test having minimum probability of error. (Author)

AD-275 357 Div. 15
(TISTP/MFA) OTS price $9.10

Applied Mathematics and Statistics Labs., Stanford U., Calif.
AN ERROR ANALYSIS OF HOUSEHOLDER'S METHOD FOR THE SYMMETRIC EIGENVALUE PROBLEM,
by James M. Ortega. 15 Feb 62, 100p. incl. tables, 17 refs. (Technical rept. no. 18)
(Contract Nonr-22537, Proj. NR-044-211)
Unclassified report

DESCRIPTORS: *Errors, *Analysis, *Matrix algebra, Tensor analysis, Computers, Programming, Perturbation theory, Transformations (Mathematics), Integral equations.

For several years probably the best numerical method for obtaining eigenvalues of real symmetric matrices has been that of Givens. The principal step is a reduction of the original matrix to tridiagonal form by a finite sequence of orthogonal congruences. Recently, a related reduction due to Householder has come into prominence. This method also reduces the original matrix to tridiagonal form by orthogonal congruences, but requires only about half the computing labor. An investigation was made of the numerical accuracy of Householder's reduction when this reduction is carried out on a digital computer using floating point arithmetic. An upper bound for the possible error introduced in the eigenvalues by the rounding error in the Householder reduction is obtained, and these results are summarized. Various numerical experiments were performed in order to ascertain the actual errors in the eigenvalues that are obtained in practice. (Author)

AD-275 473 Div. 15, 25
(TISTP/TL) OTS price $2.60

Maryland U., College Park.
RELATIVISTIC INVARIANCE AND THE SQUARE-ROOT KLEIN-GORDON EQUATION,
by J. Sucher. Apr 62, 19p. 7 refs. (Technical rept. no. 246)
(Contract AF 49(638)24)
(AFOSR-2410) Unclassified report

DESCRIPTORS: *Transformations (Mathematics), *Particles, Commutators, *Partial differential equations, *Electromagnetic fields, *Quantum mechanics, *Topology, Mapping, Matrix algebra, Integral equations, Vector analysis, Tensor analysis, Taylor's series, Green's function, Equations.

Although the usual operator invariance requirements and corresponding commutation conditions encountered in the study of the invariance of

relativistic wave equations (and other equations of physics) are sufficient conditions for invariance, they are by no means necessary. More general conditions are given and illustrated with the square-root Klein-Gordon equation. A new proof is thereby given of the Lorentz invariance of this equation. The methods developed are extended to cover the presence of external fields, and it is proved that the usual gauge invariant modification of the relativistic Hamiltonian of a spinless particle which takes into account the presence of an external electromagnetic field leads, in the quantum mechanical case, to an equation which does not admit the proper Lorentz group. This theorem and its generalization are discussed in connection with Dirac's statement that the square-root equation cannot be extended to include interaction without losing Lorentz invariance. (Author)

AD-275 582 Div. 15
(TISTP/AW) OTS price $3.60

Coordinated Science Lab., U. of Illinois, Urbana.
SOME USEFUL PROPERTIES OF COMPOSITION,
by B. R. Myers. Mar 62, 35p. incl. illus.
(Rept. no. R-135)
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: *Combinatorial analysis, Sequences, Number theory, Matrix algebra, Applied mathematics, Tests, Metamathematics, Mathematical logic.

A matrix representation of compositions of the positive real integers leads to some useful lemmas and theorems on the properties of single and multiple compositions. Examples are given of the application of these properties in the analysis of sequencing problems. (Author)

AD-275 703 Div. 15
(TISTP/MFA) OTS price $8.10

Mathematics Research Center, U. of Wisconsin, Madison.
INITIAL-BOUNDARY VALUE PROBLEMS FOR LINEAR HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS OF THE SECOND ORDER,
by Calvin H. Wilcox. Mar 62, 79p. 21 refs.
(MRC Technical summary rept. no. 301)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Functional analysis, *Partial differential equations, Operators (Mathematics), Algebraic topology, Tensor analysis.

A complete and self-contained treatment of the initial-boundary value problem for a class of linear hyperbolic partial differential equations of the second order is presented. Many concepts and techniques are incorporated and extended. The most basic of the new results is the domain of dependence inequality, which is the keystone of the theory. (Author)

AD-275 704 Div. 15
(TISTP/MFA) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
BOUNDARY VALUES OF ANALYTIC VECTOR VALUED FUNCTIONS,
by Robert Ryan. Mar 62, 29p. 4 refs. (MRC Technical summary rept. no. 303)
(Contract DA-11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Functional analysis, *Operators (Mathematics), *Algebraic topology, Scheduling, Transformations (Mathematics), Tensor analysis, Integration, Fourier analysis.

A functional analysis of boundary values of analytic vector valued functions is presented.

AD-275 705 Div. 15
(TISTP/MFA) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE CONSTRUCTION OF RELATED EQUATIONS FOR THE ASYMPTOTIC THEORY OF LINEAR ORDINARY DIFFERENTIAL EQUATIONS ABOUT A TURNING POINT,
by Rudolph E. Langer. Mar 62, 30p. 6 refs.
(MRC Technical summary rept. no. 305)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Differential equations, *Polynomials, *Operators (Mathematics), Integral equations, Functional analysis, Taylor's series, Matrix algebra.

Fully developed theory is extant, and can justifiably be referred to as classical, for the determination of the asymptotic forms of the solutions of a differential equation over any closed z-region which completely excludes turning-points. This theory applies, of course, irrespective of the region, to all equations with constant coefficients. The state of the theory is very different, namely quite fragmentary, when a turning-point is lodged within the region. For this reason, and also because modern physical theories require it, the study of the solution forms of an equation in a region about a turning-point is of eminent contemporary interest. The classical algorithms fail irretrievably in such a region, a fact which has been shown to be inevitable by results otherwise obtained, because the forms yielded by those algorithms lack adequacy to reflect the intricate functional metamorphoses which characterize the solutions of the differential equation in a turning-point neighborhood. The origin is in this case a turning point, and about this point the solutions undergo transitions between oscillatory and exponential function types. (Author)

AD-275 744 Div. 15
(TISTP/MFA) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
SOME APPROXIMATE DISTRIBUTIONS OF CROSS-SPECTRAL ESTIMATES FOR GAUSSIAN PROCESSES,
by W. Freiberger, M. Rosenblatt, and J. Van Ness.
Jan 62, 24p. illus. 11 refs. (Technical rept. no. 13)
(Contract DA 36-039-sc-78130)
Unclassified report

DESCRIPTORS: *Statistical processes, *Polynomials, *Integral equations, *Matrix algebra, Probability, Vector analysis, Statistical distributions, Time, Series.

The spectrum, co-spectrum and quadrature spectrum of a vector-valued stationary Gaussian random process are estimated by a modification of the periodogram and a method for computing the distribution of such estimates is presented. The procedure is illustrated with calculations on several simple processes. (Author)

AD-275 769 Div. 15
(TISTP/MFA) OTS price $7.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
FUNDAMENTAL SOLUTIONS FOR A CLASS OF SINGULAR EQUATIONS,
by Richard Jay Weinacht. June 62, 72p. 32 refs.
(Technical note no. BN-288)
(Contract AF 49(638)228)
(AFOSR-2616) Unclassified report

DESCRIPTORS: *Partial differential equations, *Potential theory, Operators (Mathematics), Bessel functions, Harmonic analysis, Functional analysis, Green's functions.

Singular linear elliptic partial differential equations associated with the operator of generalized axially symmetric potential theory are presented. Explicit fundamental solutions in the large are given for the equations. Mean value theorems for solutions of these equations are also presented. (Author)

AD-275 793 Div. 15
(TISTP/MFA) OTS price $5.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON A CLASS OF SINGULAR INTEGRAL EQUATIONS,
by H. F. Bueckner. Feb 62, 53p. 7 refs. (MRC Technical summary rept. no. 278)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Operators (Mathematics), *Integral equations, Transformations (Mathematics), Functions, Real variables, Polynomials, Potential theory.

Analytic functions of Cauchy integral equations are presented.

AD-275 794 Div. 15
(TISTP/MFA) OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON A CLASS OF LINEAR DIFFERENCE-INTEGRAL EQUATIONS,
by P. M. Anselone and D. Greenspan. Feb 62, 45p. 13 refs. (MRC Technical summary rept. no. 292)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Functional analysis, *Operators (Mathematics), *Mathematical logic, Matrix algebra, Polynomials, Differential equations, Difference equations, Integral equations, Integral transforms.

Functional analysis is used to satisfy linear difference-integral equations.

AD-275 796 Div. 15
(TISTP/MFA) OTS price $5.60

Mathematics Research Center, U. of Wisconsin, Madison.
EXISTENCE AND STABILITY OF SOLUTIONS OF A DELAY-DIFFERENTIAL SYSTEM,
by Rodney D. Driver. Apr 62, 50p. 21 refs.
(MRC Technical summary rept. no. 300)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Difference equations, *Differential equations, *Functional analysis, Vector analysis, Stability.

Differential systems involving rather arbitrary retarded arguments have received much attention in the Russian literature, particularly during the past 10 years or so. This is apparently due, in part, to the importance of such systems in automatic control theory. The basic existence theorems and an introduction to the Lyapunov method for a generalized difference-differential system are presented. (Author)

AD-275 895 Div. 15
(TISTP/MFA) OTS price $1.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
A CHARACTERIZATION OF COMPARABILITY GRAPHS AND OF INTERVAL GRAPHS,
by P. C. Gilmore and A. J. Hoffman. 15 Feb 62, 14p. 1 ref. (Research rept. no. RC-651)
(Contract Nonr-377500, Proj. NR 047040)
Unclassified report

DESCRIPTORS: *Mathematical analysis, *Number theory, *Algebraic geometry, Algebra, Groups (Mathematics).

Although partial ordering is an asymmetric relation, comparability in a partially ordered set is symmetric. Symmetric relations on a set which are comparability relations in some partial ordering of the elements of the set are presented. As an application, a well-know problem of Hajos, to characterize the relation of overlapping among an arbitrary family of intervals of a simply ordered set, is also solved. For both characterization problems, appropriate algorithms are proposed. (Author)

16. MEDICAL SCIENCES

AD-275 832 Div. 16, 14
(TISTB/AW) OTS price $1.25

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
PLASTICS IN THE MEDICAL INDUSTRY: A CROSS-INDEXED BIBLIOGRAPHY,
by Arnold E. Molzon. Mar 62, 46p. 204 refs.
(Plastec note no. 4)
Unclassified report

DESCRIPTORS: *Bibliography, *Plastics, *Prosthetics, *Medicine, Medical research, Toxicity, Skin, Simulation, Burns, Artificial limbs, Arteries, Contact lenses, Resins, Orlon, Polymers, Plastic tubing, Dentures.

Selected references pertaining to the use of plastics in the medical industry are listed. Included are references on the toxicity of plastics. Items are cross-indexed according to (1) type or class of plastic material; (2) subject such as: arterial, dental applications,

dust, health hazard, implants, prosthesis, toxicity; and (3) author. The sources searched included: Plastics Abstracts, Proceedings of both the Annual Conferences of the Society of Plastics Engineers and the Reinforced Plastics Division of the Society of the Plastics Industry, Applied Science and Technology Index, Index Medicus, Resin. Rubber. Plastics Yearbook, and the ASTIA Report Bibliography on Plastics. The bibliography consists of 204 items. (Author)

AD-275 840 Div. 16
(TISTB/AW) OTS price $5.60

Tufts U., Medford, Mass.
AN EXPERIMENTAL STUDY OF THE BIOLOGICAL EFFECTS OF MICROWAVE RADIATION IN RELATION TO THE EYE. Technical note,
by Russell L. Carpenter. 28 Feb 62, 51p. incl. illus. tables, 25 refs.
(Contract AF 41(657)86, Proj. 55-45)
(RADC TDR 62-131) Unclassified report

DESCRIPTORS: *Radiation injuries, *Eye, *Ophthalmology, Rabbits, Microwaves, Biochemistry.

Rabbit eyes exposed once to continuous wave or pulsed wave radiation developed opacities in the posterior cortex of the lens at 2450 mc and in the anterior cortex at 8236, 9375 and 10,050 mc. With time-power irradiation thesholds for opacity induction determined, it was found that opacities could be induced as a cumulative effect of repeated subthreshold exposures. Irradiation causes biochemical changes, including an early decrease in lens ascorbic acid content and water accumulation as opacities develop. Evidence is adduced for a non-thermal effect on the lens in addition to the usual thermal effect of microwave radiation. (Author)

AD-275 862 Div. 16
(TISTB/CCH) OTS price $3.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THYROID FUNCTION IN EXERCISED RATS,
by Merva Cottle. Oct 61, 29p. incl. illus. tables, 12 refs. (AAL TR 60-6)
(Proj. 8237; In cooperation with Washington U., Seattle)
Unclassified report

DESCRIPTORS: *Thyroid gland, *Feeding, *Metabolism, *Thyroid hormones, Pathology, Measurement, Exercise, Oxygen consumption.

The possibility that the increased metabolic rate produced by exercise (running on a revolving drum) and exercise superimposed upon long-term cold exposure (5 C) results in a consequent increased thyroid secretion rate of rats as indicated by biologic decays has been investigated. Two levels of exercise were used 1-2 hours per day and 4-6 hours per day. Both these levels of activity depressed caloric intake and weight gain but appeared to be insufficient to bring about increased energy output. Initiation of exercise did not bring about significant changes in the biologic decay rates. After exercise of longer duration the biologic half-times tended to be decreased but the difference was not significant at the 5% level from that for the unexercised rats. A relationship between food intake and the biologic decay rates was observed. Rats which ate less due to the limitations imposed by the feeding regime had longer biologic half-times of I131 than those rats which had a greater caloric intake. (Author)

AD-275 864 Div. 16
(TISTB/CCH) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECT OF COLD STRESS ON LIPOGENESIS BY ADIPOSE TISSUE,
by E. J. Masoro, Edith Porter, and Judith Patkin.
Apr 61, 7p. incl. table, 14 refs. (AAL TR 60-20)
(Proj. 8237-38; In cooperation with Tufts U. School of Medicine, Boston, Mass.)
Unclassified report

DESCRIPTORS: *Acetates, *Fatty acids, *Metabolism, *Exposure, Stress (Physiology), Biosynthesis, Liver, Tissues (Biology), Body fats.

The effect of cold stress on acetate metabolism by adipose tissue was investigated. Cold stress did not affect the ability of the epididymal fat pad to oxidize acetate-1-C14 to C14O2. The addition of unlabeled glucose to the incubation medium did not influence the rate of acetate oxidation in the case of adipose tissue obtained from either control or cold-stressed rats. In the absence of unlabeled glucose, more fatty acids from acetate-1-C14 were synthesized by the adipose tissue from control rats than by that from cold-stressed rats, although very little was synthesized by either. The addition of unlabeled glucose to the incubation medium at the physiologic concentration of 100 mg/100 ml caused the adipose tissue from both normal and cold-stressed rats to form fatty acids at high rates. It is a striking finding that cold stress, which almost abolishes hepatic lipogenesis, does not appreciably alter adipose tissue lipogenesis. (Author)

AD-275 865 Div. 16
(TISTB/LH) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
NERVOUS CONTROL OF SHIVERING. X. ROLE OF THE FIELDS OF FOREL IN SHIVERING,
by Walter J. Freeman, Douglas G. Stuart, and Allan Hemingway. Oct 61, 12p. incl. illus. tables, 21 refs. (AAL TR 60-27)
(Proj. 8238-22; In cooperation with California U., Los Angeles School of Medicine)
Unclassified report

DESCRIPTORS: *Shivering, *Nervous system, Brain, Physiology, Exposure, Test methods, Medical examination, Injuries, Surgery, Laboratory animals, Metabolism, Electrodes.

During shivering, neurons in the nucleus of Forel and the central tegmental fasciculus are active. Bilateral lesions were placed in either of these 2 regions in 35 cats. Their ability to maintain normal rectal temperature in response to external cooling was tested at intervals up to 3 weeks or more. In 10 of these cats, a test was made of the ability to raise rectal temperature from 32 C to normal by shivering before and after the lesions. In six cats, quantitative measures of oxygen consumption rates were made during cold stress before and after the lesions. The results indicate that the lesions did not impair the shivering response, except in cats with post-operative respiratory infections or diminished food intake, and then only after the development of cachexia. (Author)

AD-275 866 Div. 16
(TISTB/LH) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
PRODUCTION AND LIFE SPAN OF ERYTHROCYTES DURING HIBERNATION IN THE GOLDEN HAMSTER,

by Mary Anne Brock. Oct 61, 17p. incl. illus. table, 29 refs. (AAL TR 60-29)
(Proj. 8240-25; In cooperation with Biological Labs., Harvard U., Cambridge, Mass.)
Unclassified report

DESCRIPTORS: *Erythrocytes, *Hamsters, Mammals, Growth, Age factors, Cells (Biology), Tissues (Biology), Exposure, *Anemia, Blood.

One day following radioiron injection, the concentration of the isotope in erythrocytes of control hamsters was 14.1 times the concentration in hibernators' erythrocytes during the second day of hibernation. During this same period, hibernators' plasma contained 4.62 times the control concentration of radioiron. At definite times after tagging, the activity of chromium(51)-labeled erythrocytes was measured in warm- and cold-exposed animals and in hamsters after measured periods of hibernation. In the active animals, the potential erythrocyte half-life was approximately 40 days; the effective half-life was about 15 days. Retardation of senescence and the virtual absence of random destruction in erythrocytes of hibernating hamsters increased the potential erythrocyte life to approximately 160 days. Both the minimal metabolic activity of the animal and the retardation of intrinsic senescent processes in erythrocytes were considered to be responsible for the diminished erythropoietic stimulus in hibernating hamsters. Radioiron transport across the cell membrane, its incorporation into hemoglobin, and mitotic activity of narrow erythroid elements were component processes of erythropoiesis which were probably retarded. (Author)

AD-275 867 Div. 16
(TISTB/CCH) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CARDIOVASCULAR EFFECTS OF REFEEDING STRESS FOLLOWING STARVATION,
by B. Connor Johnson, Vincent Fiorica and others. Oct 61, 17p. incl. illus. 17 refs. (AAL TR 60-32)
(Proj. 8238-12; In cooperation with Illinois U., Urbana)
Unclassified report

DESCRIPTORS: *Starvation, *Feeding, Nutrition, *Stress (Physiology), *Heart, Blood pressure, Diet, Respiration.

AD-275 868 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
PROPIONIC ACID AS A PRECURSOR IN THE BIOSYNTHESIS OF ANIMAL FATTY ACIDS,
by E. J. Masoro and Edith Porter. Oct 61, 14p. incl. tables, 18 refs. (AAL TR 60-33)
(Proj. 8237-38; In cooperation with Tufts U. School of Medicine, Boston, Mass.)
Unclassified report

DESCRIPTORS: *Propionic acids, *Fatty acids, Biosynthesis, Laboratory animals.

The carboxyl carbon of propionate was found to be a poor precursor for the synthesis of fatty acids in the rat. The data indicate that propionate as a three-carbon unit is not incorporated into long-chain fatty acids by the intact rat to any appreciable extent. The results suggest that the conversion of propionate to long-chain fatty acids in surviving adipose tissue occurs primarily by a mechanism involving the decarboxylation of the propionate. These data are consistent with the concept that the major lipogenesis pathway in adipose tissue is not different from those described for the liver. There is evidence from the study that a small but significant fraction of the propionate is converted to long-chain fatty acids by adipose tissue in vitro by a mechanism that involves the use of propionate as an intact three-carbon unit. (Author)

AD-275 869 Div. 16
(TISTB/LH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
SMALL MAMMAL BIOCLIMATE STUDIES IN NORTHERN REGIONS,
by William O. Pruitt, Jr., Charles V. Lucier, and L. L. Hufman. Oct 61, 20p. incl. illus. 10 refs.
(AAL TR 60-34)
(Proj. 8237) Unclassified report

DESCRIPTORS: *Mammals, Arctic regions, Climatic factors, *Ecology, Forestry, Terrain, Biology, Laboratory animals.

As a base for future scientific investigations and their application to practical human needs, some small mammal bioclimate studies are made of northern regions. Two major divisions are established - the tundra (arctic treeless region) and the taiga (subarctic spruce forest). Further subdivisions are made, and 10 representative study areas are selected for Alaska. Some winter bioclimatic conditions - such as the snow cover and the moss layer - of taiga small mammals are analyzed. Points of potential value to the Air Force are drawn from studies on the importance of topographical irregularities in the formation of suitable microhabitats. Definitions of biological and ecological terms are appended. (Author)

AD-275 870 Div. 16
(TISTB/LH) OTS price $.75

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE RED CELL AND PLASMA VOLUMES OF THE RAT AND OF ITS INDIVIDUAL TISSUES AND ORGANS DURING ACCLIMATION TO COLD,
by Newton B. Everett and Lorna Matson. Oct 61, 18p. incl. illus. tables, 21 refs.
(AAL TR 60-35)
(Proj. 8237-26; In cooperation with Washington U. School of Medicine)
Unclassified report

DESCRIPTORS: *Laboratory animals, *Exposure, *Medical research, Physiology, Blood, Plasma volume, Tissues (Biology), Anatomy, Blood circulation.

17. METALLURGY

AD-275 360 Div. 17, 30, 14
(TISTM/REB) OTS price $2.60

Snell, Foster D., Inc., New York.
DEVELOPMENT OF ULTRA-THIN FILM PRESERVATIVE COMPOUNDS.

Quarterly rept. no. 3, 1 Feb-30 Apr 62.
30 Apr 62, 21p. incl. illus. tables.
(Contract NOw 61-0855c)
Unclassified report

DESCRIPTORS: *Corrosion inhibition, *Thin films, *Coatings, *Metals, Alloys, *Corrosion, *Humidity cabinets, Test equipment, Tests, Design, Controlled atmospheres, Humidity.

Two methods of preparing panels for testing in the controlled cyclic condensation humidity cabinet were studied. The results of preliminary tests indicate the possibility of obtaining highly uniform and reproducible results. Alox 2028, a mixture of organic acids and esters from oxidized petroleum fractions exhibits the best corrosion prevention of materials tested. (Author)

AD-275 365 Div. 17, 14
(TISTM/BRW) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 5, 12 Feb-11 Apr 62,
by John J. Rausch and F. C. Holtz. 8 May 62, 20p. incl. illus. tables (Rept. no. ARF 2227-5)
(Contract NOw 61-0806-c)
Unclassified report

DESCRIPTORS: High temperature research, Alloys, Heat resistant alloys, Coatings, *Vanadium alloys, *Niobium alloys, Titanium alloys, Oxidation inhibitors, *Metal coatings, *Refractory coatings, Nickel plating, Silicon coatings, Silicides, Flame spraying, Electrodeposition, Diffusion, Oxidation, Stresses, Deformation, Hardness, Vanadium compounds, Niobium compounds, Ceramic coatings, Tests, Air.

Flame-sprayed nickel coatings were found to have limited self-healing properties over defects 0.005 in. wide. Exposure of intentionally defected V-1 wt-% Ti-60 wt-% Cb to 2000 F air for 6 hr produced hardening of the alloy base to a depth of about 0.035 in. A capacity for tolerating defects was also observed in the siliconized coating. A specimen, similarly defected, showed no adverse effects except in the immediate vicinity of the defect, after 17 hr exposure at 2000 F. However, hardening occurred to a depth of at least 0.062 in. in the base metal. Oxidation tests at 1200 and 1500 F indicate that silicide coatings on V-1Ti-60Cb are not vulnerable to low-temperature, catastrophic attack. Coated specimens have a life of over 500 hr at these temperatures. Elastic deformation at room temperature, at a stress near the yield point, has little influence on subsequent oxidation behavior. Plastic deformation, however, causes the outermost silicide layer to spall from the surface with a resulting sharp decrease in oxidation life. (Author)

AD-275 368 Div. 17
(TISTM/BRW) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT AND APPLICATION OF A THEORY FOR PLASTIC DEFORMATION OF CEMENTED ALLOYS. TASK 2. DUCTILE HIGH-TEMPERATURE TUNGSTEN ALLOYS.
Summary status rept., 3 June 60-2 July 61,
by D. Weinstein and F. C. Holtz. 28 July 61, 20p. incl. illus. tables.
(Contract DA 11-022-505-ORD-3092, Proj. TB4-002)
(WAL TR 372/32-1) Unclassified report

DESCRIPTORS: Alloys, Powder alloys, Sintered alloys, *Tungsten alloys, Palladium alloys, Platinum alloys, Thorium alloys, Sintering, Bonding, Deformation, Plasticity, Hardness, Additives, Microstructure, Oxidation, Mechanical properties, Tensile properties, Melting, Temperature, High temperature research, Heat resistant alloys, Preparation, Powder metals, Powder metallurgy.

Two-phase, envelope-type structures which produced high ductility in previously studied W-Ni-Fe alloys were employed in the development of W-base materials having greatly increased melting points. Alloy systems based on W-Pd, W-Pt, and W-Th were prepared by liquid-phase sintering of blended and compacted elemental powders. The most promising composition W-20Th could be cold-rolled, and had a matrix-phase melting point in excess of 2500 C. Although some porosity was present, an ultimate tensile strength of 1750 psi was measured at 2155 C. (Author)

AD-275 369 Div. 17
(TISTM/BRW) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT AND APPLICATION OF A THEORY FOR PLASTIC DEFORMATION OF CEMENTED ALLOYS. TASK 1. ZONE SWEEPING OF CEMENTED TUNGSTEN ALLOYS.
Summary status rept., 3 June 60-2 July 61,
by N. M. Parikh. 28 July 61, 41p. incl. illus.
(Contract DA 11-022-505-ORD-3092, Proj. TB4-002)
(WAL TR 372/32-1) Unclassified report

DESCRIPTORS: Sheets, *Tungsten, *Tungsten alloys, Nickel alloys, Iron alloys, Processing, Powder metallurgy, Sintering, Purification, Zone melting, Microstructure, Tensile properties, Mechanical properties, Crystallization, Grains (Metallurgy), High temperature research, Plasticity, Deformation, Manufacturing methods, Feasibility studies.

A new method has been developed for fabrication of W sheets by powder metallurgy. The method involves densification of W by liquid-phase sintering in presence of Ni and Fe and by subsequent removal of the low-melting matrix. The matrix removal is accomplished by zone refining at temperatures above the melting point of the matrix. It is shown that, by suitable choice of processing variables, it is possible to remove most of this matrix. There is some consolidation on sintering of W grains during zone refining. The W grains are spherical in the liquid-phase sintered microstructure but change to an equiaxed shape after zone refining. The high-temperature (2000 C) mechanical properties of zone-refined W bars compare favorably with those of commercial powder metallurgy W sintered at 2600 to 3000 C. (Author)

AD-275 379 Div. 17, 25
(TISTM/BRW) OTS price $2.75

Battelle Memorial Inst., Columbus, Ohio.
NOTCH SENSITIVITY OF REFRACTORY METALS.
Rept. for 1 Oct 60-31 Aug 61,
by A. G. Imgram, M. W. Mallett and others.
Jan 62, 117p. incl. illus. tables, 21 refs.
(Contract AF 33(616)7604, Proj. nos. 7351 and 7381)
(ASD TR 61-474) Unclassified report

DESCRIPTORS: *Refractory materials, Heat resistant alloys, Metals, Alloys, *Niobium, *Tantalum, *Niobium alloys, *Tantalum alloys, Tungsten alloys, Molybdenum alloys, Zirconium alloys, Tensile properties, Stresses, Sensitivity, Chemical impurities, Hydrogen, Oxygen, Transition temperature, Reaction kinetics, Thermodynamics.

The effects of interstitial O and H on the tensile and notch tensile properties of Ta and Nb were investigated. The tensile and notch tensile properties of Ta-10W and F-48 Nb alloy were determined also. The O and H additions resulted in notch-sensitive behavior at higher temperatures than for pure Ta and Nb, and, similarly, transition temperatures are increased by the interstitial additions. The F-48 alloy also shows notch-sensitive behavior at higher temperatures and has a higher transition temperature than Nb. The Ta-10W alloy was not notch sensitive, and retained excellent ductility at -420 F. In addition, reaction kinetics in the Ta-H system was studied. (Author)

AD-275 394 Div. 17, 14
(TISTB/AW) OTS price $1.50

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Virginia L. Frazier. Apr 62, 39p.
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Indexes, *Reports, *Metals, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Iron alloys, Beryllium, Titanium, Magnesium, Graphite, Ceramic materials, Refractory materials, Niobium, Molybdenum, Tantalum, Tungsten, Coatings, Heat treatment, Welding, Metal forming presses, Buckling, Fatigue (Mechanics).

AD-275 395 Div. 17, 25
(TISTM/BRW) OTS price $4.00

Douglas Aircraft Corp., Long Beach, Calif.
CRACK STRENGTH AND CRACK PROPAGATION CHARACTERISTICS OF HIGH STRENGTH METALS.
Rept. for 1 Aug 60-31 May 61,
by R. H. Christensen and P. H. Denke. Jan 62, 258p. incl. illus. tables, 35 refs.
(Contract AF 33(616)7444, Proj. 7381)
(ASD TR 61-207) Unclassified report

DESCRIPTORS: Metals, Alloys, Sheets, *Fracture (Mechanics), Propagation, Fatigue (Mechanics), Creep, High temperature research, Cryogenics, *Steel, Stainless steel, *Nickel alloys, Chromium alloys, Cobalt alloys, Molybdenum alloys, *Molybdenum, Iron alloys, Aluminum alloys, *Titanium alloys, Vanadium alloys, Stresses, Mechanical properties, Elasticity, Plasticity, Deformation.

Results of a fracture testing program for high strength sheet metals are presented. More than 500 sheet stock panels ranging in width from 1 to 18 in. and in thickness from 0.020 to 0.100 in. were tested. These panels contained centrally located cracks generated principally by fatigue crack exposure times under a variety of environments. In general the fatigue crack is shown to be a more severe stress raiser than any manufactured notch yet investigated. Fracture strengths of the cracked panels were determined for rupturing temperatures ranging from -340 to 2500 F. The experimental results were studied analytically. A semi-empirical expression for residual strength is derived. This expression is based on a modification of the formula given by Crichlow for the effective width of the plastic zone. An expression for the rate of crack propagation also is presented. A digital analysis of the elastic and plastic stress and strain distribution in the cracked plate is discussed. (Author)

AD-275 441 Div. 17, 14
(TISTM/EJH) OTS price $4.60

General Dynamics/Fort Worth, Tex.
COMPILATION OF UNPUBLISHED MATERIALS INFORMATION.
Progress rept. no. 1, 14 Nov 61-15 May 62 on Phase 2,
by J. M. Shults. 15 May 62, 40p. incl. tables.
(Rept. no. FPR-003, Issue no. 1)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Materials, *Metals, *Alloys, *Refractory coatings, Ceramic coatings, Heat resistant paints, Seals, Jet engine fuels, Lubricants, Solids, Sheets, Sandwich panels, Silicones, Windshields, Polymers, Inorganic substances, Processing, Corrosion, Hydrogen embrittlement, Welding, Electron beams, Brazing, Bonding, *Steel, Titanium alloys, Nickel alloys, Niobium alloys, Tungsten alloys, Cobalt alloys, Beryllium.

Brief reports on each item of material and processes work in progress at General Dynamics/Fort Worth during the period, 14 Nov 61 through 15 May 62, are presented. Each report contains a brief description of the objective, a discussion of the program, and results and conclusions if available. Reports on 28 different programs are included. (Author)

AD-275 449 Div. 17, 25
(TISTM/BRW) OTS price $2.60

Stanford U., Calif.
ELASTIC PROPERTIES RESEARCH.
Progress rept. no. 5, 1 Oct 61-31 Mar 62,
by J. L. Lytton, K. T. Kamber and others.
31 Mar 62, 26p. incl. illus. 16 refs.
(Contract AF 33(616)6789)
Unclassified report

DESCRIPTORS: Alloys, Metals, *Ferromagnetic materials, Sheets, Ferromagnetism, Measurement, Creep, *Elasticity, Iron, Iron alloys, Silicon alloys, Copper, Grains (Metallurgy), Crystals, Single crystals, Lattices, Relaxation time, Deformation, Diffusion, Plasticity, High temperature research, Stresses, Temperature, Nickel, Cobalt.

Additional test results on the modulus of elasticity and creep properties of textured Fe-Si (3% Si) sheet reveal a strong effect of ferromagnetism on the elastic and plastic properties. Excellent agreement is obtained between the activation energies for creep and self-diffusion if a modulus-compensated creep rate is utilized in the determination of the activation energy for self-diffusion. Similar tests on pure Fe (Puron) reveal almost identical trends. Dynamic modulus measurements were made on polycrystalline Cu (grain diameter, L = 0.03mm) containing a strong preferred orientation texture and on a randomly oriented polycrystalline sample. A resonant frequency could not be detected beyond 300 C for the random Cu sample; the same difficulty was not encountered with the textured Cu (low angle boundaries) until about 550 C was reached. These peculiar results were tentatively associated with grain boundary relaxation effects. (Author)

AD-275 451 Div. 17, 25
(TISTM/REB) OTS price $2.60

Hammond Metallurgical Lab., Yale U., New Haven, Conn.
DIRECT OBSERVATION AND ANALYSIS OF CRACK PROPAGATION IN IRON - 3% SILICON SINGLE CRYSTALS.
Doctorial thesis,
by A. S. Tetelman and W. D. Robertson. Feb 62, 29p. incl. illus. table, 16 refs. (Technical rept. no. 5)
(Contract Nonr-60928)
Unclassified report

DESCRIPTORS: Single crystals, *Iron, *Silicon, *Fracture (Mechanics), Plasticity, Deformation, *Plastic flow, Microstructure.

Microcracks, 0.01 cm long on (100) planes, are produced by precipitation of H in Fe-3% Si single crystals when H is introduced either by cathodic charging, or by quenching from an H atmosphere at a high temperature. Plastic deformation produced during growth of cracks can be observed as arrays of decorated dislocations in the volume of the crystals. The slip planes involved in plastic deformation around the tip of a crack were identified and they are in accord with those predicted from theoretical considerations. Because of the discontinuous nature of the process of crack growth under internal pressure, it is possible to obtain values for the energy expended in plastic deformation as a function of crack length. For cracks about 0.01 cm long, the plastic deformation is of the order of the intrinsic surface energy of the crystal. Values for the distance to which plastic deformation extends from the tip of a stationary crack were measured and they compare favorably with values predicted from theoretical considerations. (Author)

AD-275 461 Div. 17, 25
(TISTM/EJH) OTS price $4.60

Northwestern Technological Inst., Evanston, Ill.
KINETICS OF FORMATION AND REVERSION OF GUINIER-PRESTON ZONES IN ALUMINUM-BASE ALLOYS,
by H. Herman, M. E. Fine and others. Apr 62, 26p. incl. illus. tables, 42 refs.
(Contract AF 49(638)524)
(AFOSR-1710) Unclassified report

DESCRIPTORS: *Aluminum alloys, Copper alloys, Zinc alloys, Solids, Solutions, *Phase studies, Lattices, Crystal structure, Aging, Kinetic theory, Deformation, Plastic flow, Solid state physics.

This report includes:
REVERSION AND REFORMATION GP I IN Al-1.7 AT. PERCENT Cu, by H. Herman and M. E. Fine. Apr 62.

FORMATION AND REVERSION OF GUINIER-PRESTON ZONES IN Al-5.3 AT .PERCENT Zn, by H. Herman, J. B. Cohen, and M. E. Fine. Apr 62.

Revision and reformation of GP I in Al-1.7 at.% Cu: Kinetics of reversion and reformation of GP I were studied resistometrically in this alloy. The revision is over in about 1/2 min at 205 C, irrespective of the amount of primary aging. After revision the occurrence of incubation time before reaging was substantiated. Plastic deformation drastically accelerates the reaging kinetics. An incubation time is observed only if the specimen is aged before reversion. Incubation time and the effect of plastic deformation indicated that nucleation of GP I is heterogeneous. Formation and reversion of GP zones in Al-5.3 at.% Zn: Studies were made by measurement of electrical resistance, Young's modulus, critical resolved shear stress and x-ray scattering. After a long aging treatment, about 1/2 of the Zn atoms are associated with zones; after a long reaging treatment, about 1/4 are associated with zones.

AD-275 483 Div. 17
(TISTM/BRW) OTS price $1.00

Watertown Arsenal Labs., Mass.
MECHANICAL PROPERTIES OF TITANIUM AND ALUMINUM ALLOYS AT CRYOGENIC TEMPERATURES,
by Charles F. Hickey, Jr. Mar 62, 37p. incl. illus. tables, 7 refs. (Rept. no. WAL TR 340.2/1)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Aluminum alloys, Mechanical properties, Low temperature research, Cryogenics, Tensile properties, Impact shock, Sheets, Rods, Molybdenum alloys, Vanadium alloys, Copper alloys, Chromium alloys, Iron alloys, Manganese alloys, Magnesium alloys, Silicon alloys, Zinc alloys.

Low temperature mechanical properties of Ti and Al alloys in both bar and sheet form were obtained as a function of testing temperature. For bar material, tensile and Charpy impact data were obtained at temperatures ranging from room temperature to -452 F for the tensile and from room temperature to -441 F for the Charpy tests. For the material in the sheet form, notched tension sheet and unnotched tension sheet data were obtained at temperatures between room temperature and -320 F. A unique aspect of this work is the fact that materials which were investigated in both the bar and sheet form were from the same heat. The results of this investigation indicate that a majority of the Ti and nearly all the Al alloys are acceptable for applications in a cryogenic environment. (Author)

AD-275 513 Div. 17, 26
(TISTM/BRW) OTS price $8.10

Propellex Chemical Div., Chromalloy Corp., Edwardsville, Ill.
A STUDY OF EXPLOSIVE FORMING SELECTED REFRACTORY METALS.
Final program rept.
1 Apr 62, 53p. incl. illus. (Rept. no. 1096-5F)
(Contract NOw 61-0832-c)
Unclassified report

DESCRIPTORS: *Explosive forming, *Refractory materials, *Tungsten, *Molybdenum alloys, Titanium alloys, Sheets, Deformation, Velocity, Measurement, Dies, Design, Strain gages, Metal films, Foils, Photographic analysis, Metals, Alloys, Processing, Metal plates, Stainless steel, Explosives, RDX, Shock waves.

A study was made to determine the explosive forming characteristics of Mo 0.5% Ti alloy and tungsten. The study included an investigation to optimize the strain rate condition up to and including a forming temperature of 1000 F. A brief analysis was also made to determine the prime factor to be considered in the choice of a transmission media. For 40% dynamite, the Mo-1/2 Ti displayed a maximum strain rate of approximately 18 in./in./sec with a resulting elongation of 9 per cent. The strain rates for W, using both RDX and 40% dynamite were essentially the same as those for the Mo-1/2 Ti. The maximum achievable elongation for W varied from 6% for 40% dynamite to 9% for RDX. Although a somewhat great

elongation could be obtained for both Mo-1/2 Ti and W using RDX, results of forming tests indicated that optimum conditions could be better approached through the use of lower detonation 40% dynamite. (Author)

AD-275 565 Div. 17
(TISTM/BRW) OTS price $2.60

Clevite Corp., Cleveland, Ohio.
FIBER REINFORCEMENT OF METALLIC AND NONMETALLIC COMPOSITES.
Interim technical rept., 17 Jan-17 Apr 62,
by R. H. Baskey. May 62, 21p. incl. illus. tables, 15 refs.
(Contract AF 33(657)7139)
(ASD TR 7-924, Vol. 2) Unclassified report

DESCRIPTORS: *Composite materials, *Reinforcing materials, Fibers, Metallic textiles, Wire, Tungsten wire, Molybdenum wire, Powder metals, Stainless steel, Nickel alloys, Chromium alloys, Tensile properties, Copper, Cobalt, Iron alloys, Physical properties, Processing.

Initial parameter studies indicated that powder metal bars of stainless steel type 316 were reinforced by 14 vol-% 10-mil diam continuous W wires. The room temperature tensile strength of the stainless steel was increased from 40,000 psi to 48,000 psi by adding W wires. Nichrome V (80 Ni-20 Cr) matrices were not reinforced by either W or Mo wires. (Author)

AD-275 581 Div. 17, 25
(TISTM/BRW) OTS price $9.60

Harvard U., Div. of Engineering and Applied Physics, Cambridge, Mass.
THE FRACTURE OF METALS UNDER IMPULSIVE LOADING CONDITIONS,
by John L. O'Brien. 20 Dec 61, 78p. incl. illus. table, 37 refs.
(Contracts DA 19-129-qm-1166, Proj. 7-99-01-001 and Nonr-186635, Proj. NR 031-486)
Unclassified report

DESCRIPTORS: *Metals, *Fracture (Mechanics), Impact shock, Compression shock, Shock waves, Pellets, Stresses, Explosions, Aluminum, Copper, Lead, Nickel, Silver, Aluminum alloys, Beryllium alloys, Copper alloys.

A modification of the Hopkinson pressure-bar technique (B. Hopkinson, Trans. Roy. Soc., London, A213:437, 1914) was used to study the spalling of metals impacted with a compression shock-wave. The wave was generated by an explosive in contact with a metal block, and a rare-faction wave was produced upon reflection of the incident wave from the free-surface of the block. The spatial distribution of pressure behind the wave front was determined by the measurement of the velocities of pellets inserted in the block. From this pressure distribution and the measured fracture distance, the tension stress at fracture was determined for five face-centered cubic metals: aluminum, copper, silver, nickel, and lead. The fracture stresses of two high-strength alloys of aluminum and copper were also determined. The modifications of the Hopkinson experiment involved the use of a front pellet, ahead of the fracture pellet, to remove the unknown front of the wave, as well as a variation in the depth of this pellet to vary the time of application of the fracture stress. (Author)

AD-275 615 Div. 17, 25
(TISTM/BRW) OTS price $2.60

New York U., N. Y.
INVESTIGATION OF CREEP BUCKLING OF COLUMNS AND PLATES. PART V. THEORY OF CREEP BUCKLING OF PERFECT PLATES AND SHELLS.
Final rept. for Apr-Nov 61 on Materials Application,
by George Gerard. Feb 62, 16p. incl. illus. 8 refs.
(Contract AF 33(616)5807, Proj. 7381)
(WADC TR 59-416, pt. 5) Unclassified report

DESCRIPTORS: *Metal plates, Sheets, *Creep, *Buckling, Equations of state, Stresses, Deformation, Theory, Stability, Aluminum alloys, Solid state physics, *Structural shells.

A theory for creep buckling of perfect flat plates under axial compression is presented which is based on the use of an equation of state to represent the incremental stresses that arise at buckling. The theoretical results which apply to any arbitrary creep properties are directly equivalent to inelastic buckling solutions where now the tangent and secant moduli are strain rate dependent quantities. Based on these results, a general theory for plates and shells under various types of loadings is presented as a logical extension of the compressed plate case. (Author)

AD-275 712 Div. 17, 25
(TISTM/BRW) OTS price $1.60

Illinois U., Urbana.
AN INVESTIGATION OF THE USE OF INTERNAL FRICTION TECHNIQUES IN THE STUDY OF DIFFUSION AND PHASE CHANGES IN METALS.
Final rept., 1 Apr 60-31 Mar 62,
by Charles Wert. 15 Apr 62, 13p.
(Contract AF 49(638)672)
(AFOSR-2573) Unclassified report

DESCRIPTORS: *Alloys, *Metals, *Diffusion, *Phase transitions, *Internal friction, Measurement, Ferromagnetic materials, Magnetic alloys, Iron alloys, Vanadium alloys, Silver alloys, Gold alloys, Zinc alloys, Relaxation time, Solubility, Oxygen, Solid state physics, High temperature research, Low temperature research, Paramagnetic crystals, Ferromagnetics, Tracer studies, Elasticity, Lattices, Hafnium, Zirconium, Precipitation, Carbon, Nitrogen.

The following work is described: (1) measurements of diffusion in the ferromagnetic alloy, Fe-18%V, (2) the Zener relaxation in ternary alloys, (3) diffusion of gases in Hf and Yb, (4) metal-gas equilibrium and the Nb-N terminal solid solution, (5) precipitation in Au-Ni alloys, and (6) diffusion studies at high pressure. (Author)

AD-275 730 Div. 17
(TISTM/EJH) OTS price $3.60

Brown U., Providence, R. I.
AN EXPERIMENTAL STUDY OF SUBSEQUENT YIELD SURFACES. CORNERS, NORMALITY, BAUSCHINGER AND ALLIED EFFECTS,
by P. K. Bertsch and W. N. Findley. Jan 62, 24p. 21 refs. (Technical rept. no. 27; Rept. no. EMRL-21)
(Contract Nonr-56220, Proj. NR-064-424)
Unclassified report

DESCRIPTORS: *Aluminum alloys, Aluminum tubing, Cylindrical bodies, Loading, Stresses, *Deformation, *Plastic flow, *Plasticity, Theory.

An initial yield and seven subsequent yield curves were determined from a sequence of loadings of the same thin-walled tubular specimen of 6061-T6 Al under tension and torsion, including reversed torsion. The yield curves were explored by piercing them very slightly at a number of points. Plastic strain-increment vectors for zigzag loading paths were determined also. Although initial yield curves and most subsequent yield curves resulting from appreciable plastic deformation in simple tension were smooth curves without regions of high local curvature, combined tension and torsion loading in the plastic range tended to develop a corner. Changes in the direction of the stress-increment vector did not produce consistent corresponding large changes in the direction of the plastic strain-increment vector. These observations indicated a blunt corner with a rounded rather than a pointed vertex. Convexity of all yield curves and normality of the plastic strain-increment vectors were verified, or at least not contradicted. (Author)

AD-275 747 Div. 17, 25
(TISTM/BRW) OTS price $2.60

Denver Research Inst., Colo.
A FUNDAMENTAL INVESTIGATION OF THE ALLOYING BEHAVIOR OF THE RARE EARTHS AND RELATED METALS.
Semi-annual progress rept. no. 5, 1 Nov 61-30 Apr 62,
by Albert S. Yamamoto, Charles E. Lundin, and Joseph F. Nachman. May 62, 17p. incl. illus. tables, 5 refs.
(Contract AF 33(616)6787, Proj. 7021)
Unclassified report

DESCRIPTORS: *Alloys, *Praseodymium, *Neodymium, Rare earth elements, *Phase studies, Liquids, Solids, Solubility, X-ray diffraction analysis, High temperature research, Hardness, Density, Transition temperatures, Melting, Vaporization, Vapors.

The phase diagram of the system, Pr-Nd, was constructed from thermal analysis and metallographic data. This system exhibits complete liquid solubility and solid solubility in both the low-temperature and high-temperature phases. Lattice parameter determinations of the low-temperature phase throughout the system are under way. Knudsen effusion studies have provided data to determine the activities of liquid solutions of Pr and Nd. Plots of the activities versus the mole fraction in the liquid indicate essentially ideal behavior for Nd and a slight positive deviation from ideality for praseodymium. Liquid density studies are currently being undertaken to gain a better understanding of the behavior of liquid alloys of Pr and Nd. (Author)

AD-275 750 Div. 17, 26
(TISTM/TCG) OTS price $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PREPARATION AND EVALUATION OF HIGH PURITY BERYLLIUM.
Quarterly progress rept., 2 Oct 61-2 Apr 62,
by G. E. Spangler, M. Herman and others.
2 Apr 62, 42p. incl. illus. tables, 12 refs.
(Rept. no. Q-B1933 1-2)
(Contract NOw 62-0536-d)
Unclassified report

DESCRIPTORS: *Beryllium, *Foils, *Single crystals, *Zone melting, Metal films, Crystals, Crystallization, Mechanical properties, Stresses, Deformation, Grains (Metallurgy), Resistance, Electron microscopy, Measurement, *Fracture (Mechanics).

The production of high purity Be and its deformation and fracture characteristics are being studied. It was demonstrated that the extent to which the basal plane can glide, within the restriction of the type of tensile test, is related to the amount of impurities present in the Be. The limited ductility of the polycrystalline material apparently results from the constraining effects of neighboring grains upon one another rather than as a result of the basal planes being unable to sustain flow without cracking. It is felt, however, that the decrease in yield strength and work hardening observed in the zone refined single crystals will tend to reduce the tendency for crack formation resulting from nonhomogeneous basal slip. The preparation and evaluation of Be single crystals of higher purity through the use of higher purity starting materials will be made. Another phase will be devoted to an evaluation of the effects of realloying zone refined Be with selected impurities. Transmission electron microscopy studies of thin films of zone refined beryllium will also be conducted. A final phase will be devoted to the determination of residual resistivity ratios of zone refined and re-alloyed beryllium by means of the eddy current technique. (Author)

AD-275 812 Div. 17, 26
(TISTM/EJH) OTS price $23.50

Ladish Co., Cudahy, Wis.
INVESTIGATION OF THE EFFECTS OF MELTING PROCESSES UPON THE TRANSVERSE DUCTILITY OF H-11 STEEL AT HIGH STRENGTH LEVELS.
Interim engineering rept. no. 2, 18 May-18 Nov 61,
by Joseph C. Truszynski, Carl Lugar, and Jack A. Yoblin. May 62, 493p. incl. illus. tables.
(Contract AF 33(600)38767, Proj. 7-678)
(ASD TR 7-678, vol. 2)
Unclassified report

DESCRIPTORS: *Steel, *Melting, Vacuum apparatus, Electric arcs, Processing, Heat treatment, Forging, Electrodes, Mechanical properties, Tensile properties, Tests, Tables, Statistical data, Aircraft, Materials.

Transverse ductility of electric furnace air melt and vacuum arc remelt H-11 steels, strength range 280 to 300 Ksi, was compared by means of statistical analysis of 4127 sets of tensile test data obtained from six mills and contractor's records. Analysis of the data, representing 502 heats, established that remelt material (1) exhibits a superior strength-ductility relationship in all billet sizes of each mill, irrespective of test location, and (2) displays a greater uniformity of properties. Findings were augmented by contractor tests above 300 Ksi. (Author)

AD-275 839 Div. 17
(TISTM/EJH) OTS price $3.60

Solar Aircraft Co., San Diego, Calif.
ACCUMULATING AND REPORTING UNPUBLISHED DATA ON MATERIALS.

Final progress rept., 1 Mar-15 May 62,
by Paul J. Valdez. 15 May 62, 30p. incl. tables.
(Rept. no. RDR 1234-5)
(Contract AF 33(616)8375)
Unclassified report

DESCRIPTORS: *Steel, *Stainless steel, *Titanim alloys, *Nickel alloys, Chromium alloys, Aging, Stresses, Heat treatment, Aluminum coatings, Sheets, Foils, Welded joints, Mechanical properties, Tensile properties, Fatigue (Mechanics), Fracture (Mechanics), Tables, Tests.

Unpublished data is presented concerning the following studies: strain aging of 300M steel; ausforming of H-11, 300M, 4340, and super tricent steels; aluminizing 75A titanium alloy and Udimet 500; and aging of PH 15-7 Mo and Inconel X alloys. Other studies dealt with the mechanical properties of the following titanium alloy foils: RS 120 (6Al-4V), RS 140 (5Al-2.75Cr-1.25Fe), and 13V-11Cr-3Al.

AD-275 874 Div. 17
(TISTM/EJH) OTS price $4.60

Birmingham Small Arms Group Research Center (Gt. Brit.).
INVESTIGATION INTO THE TUNGSTEN-RICH REGIONS OF THE BINARY SYSTEMS TUNGSTEN-CARBON, TUNGSTEN-BORON AND TUNGSTEN-BERYLLIUM. PART I. TUNGSTEN-CARBON EQUILIBRIUM SYSTEM.

Rept. for 1 Oct 59-25 Aug 61 on Metallic Materials,
by H. J. Goldschmidt and J. A. Brand. Mar 62,
34p. incl. illus. tables, 30 refs.
(Contract AF 61(052)306, Proj. 7351)
(ASD TDR 62-25, pt. 1) Unclassified report

DESCRIPTORS: *Tungsten alloys, Carbon alloys, Boron alloys, Beryllium alloys, Heat resistant alloys, Solids, Solutions, *Phase studies, Phase transitions, Transition temperatures, Crystal structure, Lattices, High temperature research, Tungsten compounds, Carbon compounds, Mechanical properties, Test methods, Tungsten wire, Powder metals, Microscopy, X-ray diffraction analysis.

The solid-solubility limit of C in W is presented. Numerous highly refined X-ray diffraction, microscopy, and physical test techniques for detecting the solubility limit were explored. The solid solution of C in W is clearly interstitial. C solubility is finite, attaining a maximum of approximately 0.3 atomic % C at the eutectic temperature, decreasing to 0.05 atomic % C near 2000 C and to insignificant amounts at lower temperatures. Thus, precipitation hardening effects should be liable to occur in W-C. The dimorphism of W2C now seems established. The normal hexagonal form transforms into a second allotropic (NaCl type) cubic form at a temperature close to the melting point. A marked grain-refining effect by the addition of small amounts of carbon to pure tungsten was observed. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-275 498 Div. 18
(TISTA/GEC) OTS price $5.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
THEORY OF SORTIE RATES.
Interim research memo,
by J. K. Tyson. 22 Jan 62, 58p. 4 refs. (Interim research memo. no. 5)
Unclassified report

DESCRIPTORS: *Aerial warfare, Naval aircraft, Naval operations, Scheduling, *Operations research, Statistical analysis, Probability.

A mathematical analysis was made of sortie rates as an example of a general repetitive process, involving the use of equipments which are subject to random requirements for repair or replacement. This study presents a unified treatment of the transient and steady-state sortie rates under a variety of operational conditions, and provides a mathematical justification for the expected value calculations made in the earlier studies. Probability distributions for the numbers of sorties were derived for the case in which all available aircraft are employed. An investigation is also made under the alternative assumption that the number of aircraft to be used is less than the number that may be available, as in the case of Combat Air Patrol, and approximate formulae are derived for the probability that the required number of aircraft will be available. The final section summarizes the results obtained in a form suitable for the numerical computation of sortie rates or aircraft requirements. (Author)

AD-275 526 Div. 18
(TISTW/RD) OTS price $5.60

RAND Corp., Santa Monica, Calif.
OPTIMAL DECISION RULES FOR THE PROCUREMENT, REPAIR, OR DISPOSAL OF SPARE PARTS,
by E. S. Phelps. May 62, 49p. incl. illus. 10 refs. (Memo. no. RM-2920-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Air force logistics, *Air force supplies, *Air force procurement, Supplies, Procurement, Maintenance, Programming, Scheduling, Mathematical prediction, Air force equipment.

A theoretical analysis of a fundamental Air Force logistics problem is presented, namely the procurement-repair-disposal tradeoff. This study should be of interest to mathematicians and other technical analysts concerned with the use of mathematical techniques in programming and planning problems. This study contains an unusual application of dynamic programming. In most such applications, the programming problem is to determine the value of a single policy variable; whereas in this study, the values of two policy variables are simultaneously determined. The simplifying assumptions used in the model do not distort the problem unduly, and it is possible to relax them if future research indicates the desirability of doing so. (Author)

AD-275 623 Div. 18
(TISTA/GEC) OTS price $6.60

RAND Corp., Santa Monica, Calif.
EFFECT OF CARGO CHARACTERISTICS ON ROUTINE AIRLIFT OPERATIONS,
by A. H. Pascal. May 62, 57p. incl. illus. tables, 9 refs. (Memo. no. RM-2984-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: Cargo, Loading, Scheduling, Transport planes, *Air transportation, Military transportation, *Logistics, *Operations research, Military requirements, Statistical analysis, Probability.

An investigation was made of the relation between the efficiency of the peacetime intercontinental air cargo system and various policy constraints on airlift. Distributions were compiled of the numbers and sizes of shipments arriving at the cargo terminal, by day, priority, and route. These data were used to fill up a warehouse internalized in the computer, and shipments were assigned to aircraft through a simulation of loading procedures. It was then possible to compute the number of aircraft loads required each day to move the cargo, and thus also over the course of the year. The applications of the technique were aimed at exploring several important problems in peacetime airlift operations and planning: (1) to evaluate the efficiency of various combinations of cargo aircraft in moving shipments of known densities; (2) to analyze the effect of changes in standard port holding times; (3) to reveal the consequences of adopting alternative priority systems; and (4) to consider the relative advantages of call versus fixed-schedule commercial contracting arrangements. (Author)

AD-275 825 Div. 18, 1
(TISTA/GEC) OTS price $5.60

System Development Corp., Santa Monica, Calif.
AN ESTIMATE OF THE 1970-75 ENVIRONMENT FOR AIR-TRAFFIC CONTROL.
Technical memo.,
by L. Farr and H. Schmitz. 18 Sep 61, 54p. incl. illus. table, 67 refs. (Technical memo. no. TM-599/000/01)
Unclassified report

DESCRIPTORS: *Air traffic control systems, Air force operations, Commercial planes, Air traffic, Density, *Operations research, Communication systems, Navigation, Airports, Airport radar systems, Radar, Radar beacons, Ground support equipment, Military requirements, Automatic pilots.

Research began on terminal air traffic control. The results provide a basis for the initial design of the Terminal Air Traffic Control system to be simulated in the Systems Simulation Research Laboratory. (Author)

Division 18 - MILITARY SCIENCES AND OPERATIONS
Division 19 - NAVIGATION

19. NAVIGATION

AD-275 624 Div. 19, 30, 31, 2
(TISTP/MFA) OTS price $7.60

RCA Service Co., Inc., Patrick Air Force Base, Fla.
A METHOD OF REDUCTION OF LORAC DATA AS PROGRAMMED FOR THE VERDAN COMPUTER,
by Donald B. Gennery. Apr 62, 44p. incl. illus. tables, 3 refs. (Mathematical Services no. TR-62-4)
(Subcontract to Pan American World Airways, Inc., New York, Contract AF 08(606)3413)
(MTC TDR 62-3) Unclassified report

DESCRIPTORS: *Hyperbolic navigation, *Navigation computers, *Programming, *Geodetic data, Ships, Computer logic, Mathematical prediction, Digital computers, Memory devices, Sequential analysis.

A method is described for an iterative Lorac to geodetic solution using a generalization of Newton's method of two unknowns. The mathematics are derived so as to be suitable for a fast solution on a small digital computer. A program for the Verdan computer using this method is given in full. (Author)

AD-275 853 Div. 19
(TISTA/GEC) OTS price $2.60

Aeronautical Chart and Information Center, St. Louis, Mo.
SPACE REFERENCE SYSTEMS,
by Edward M. Thompson. Apr 62, 19p. incl. illus. 9 refs. (ACIC Interim technical rept. no. 98)
Unclassified report

DESCRIPTORS: *Space flight, Space probes, Lunar probes, Guidance, *Space navigation, Astronautics, Inertial navigation, Geometry, Orbital flight paths, Perturbation theory.

This paper presents systems which can be used in different phases of space flight. The following coordinate systems are described: Geocentric system, Heliocentric system, Selenographic system, Planetographic system, and Inertial system. For the initial phase of a flight, the Earth-centered, geocentric system may be used. The midcourse phase of the flight begins when the Earth's gravitational force is no longer predominant. At this point, the reference system can be changed to heliocentric or inertial. As the vehicle approaches the target, the selenographic or planetographic system may be used. The selenographic system is centered at the center of the Moon and the planetographic system can be based on the center of any planet. Procedures involved in transition from one system to another are developed under a section on coordinate transformation. Various disturbing or perturbing effects are discussed and the possible effects on a space vehicle and its instantaneous reference system are described. Criteria for selection of an optimum coordinate system are listed, but no attempt is made to select an optimum system. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-275 454 Div. 20
(TISTP/WH) OTS price $4.60

Illinois U., Urbana.
THE TRANSVERSE POLARIZATION OF INTERNAL CONVERSION ELECTRONS EMITTED FOLLOWING BETA DECAY,
by J. Bernard Blake. Mar 62, 42p. incl. illus. 30 refs. (Technical rept. no. 35)
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: Theses, *Polarization, Electrons, *Beta decay, *Radioactive decay, Radioactive isotopes, Scattering, Nuclear spins.

The transverse polarization of conversion electrons following beta decay was measured for eight different decays (Hg-203, Pa-233, Au-198, Au-199, Ce-141, Ce-144, Tm-170, and I-131). The results of the measurements are presented and the experimental work is discussed in detail.

AD-275 455 Div. 20
(TISTP/WH) OTS price $9.10

Illinois U., Urbana.
MULTINUCLEON CAPTURE OF K(-) MESONS AND SOME ASSOCIATED PROBLEMS OF THE K(-) CAPTURE PROCESS,
by George Thomas Condo. Mar 62, 93p. incl. illus. tables, 59 refs. (Technical rept. no. 36)
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: Theses, *Mesons, *Meson capture, Meson cross sections, Meson scattering, Nuclei, *Hyperons, Photographic emulsions.

The multinucleon absorption of K(-) mesons is studied by searching for fast $\Sigma^{\pm}$ hyperons emitted from K(-) capture stars in normal and in water-soaked Ilford G5 nuclear emulsion. These fast (> 60 mev) hyperons are the only certain indication that a K(-) meson was absorbed non-mesonically. On the basis of these data and their reasonable similarity with that of Evans et al., it is concluded that the capture of K(-) mesons by the light emulsion nuclei (C,N,O) is 2.2 ± .3 times more likely to yield a fast hyperon that is K(-) capture by Ag and Br. Combining this with the hyperon absorption probabilities deduced from a study of Auger electron emission, the multinucleon K(-) absorption probability is approximately the same for light and heavy capturing nuclei in nuclear emulsion (excluding hydrogen). Of 56 fast hyperon events, 17 were consistent with K(-) capture by a light nucleus. By combining these events with those reported by Evans et al., we find when a K(-) meson is absorbed through a multinucleon channel by C^{12} and O^{16}, that the basic interaction in 92% of the events is consistent with the destruction of a single α particle subunit. The Auger spectrum resulting from capture and subsequent cascade of K(-) mesons shows evidence for the line structure predicted by conventional theory. (Author)

AD-275 468 Div. 20, 25, 4
(TISTP/MFA) OTS price $15.00

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MASS SPECTROGRAPHIC LINES OF THE ELEMENTS,
by E. B. Owens and A. M. Sherman. 3 Apr 62, 211p. (Technical rept. no. 265)
(Contract AF 19(604)7400)
(AFESD TDR 62-88) Unclassified report

DESCRIPTORS: *Tables, *Mass spectroscopy, *Spectrographic analysis, *Chemical elements, Ions, Solids, Transport properties, Mass number, Atomic mass unit, Isotopes.

A compilation of tables which records the lines observable by RF spark ionization of inorganic solids in a Mattauch-Herzog double-focusing mass spectrograph is presented. Arrangement by element presents the lines for each in order of their increasing apparent mass. For all the known naturally-occurring isotopes, the tables delineate: ions with charge of +1 through +9, multiatomic clusters containing from one to ten atoms and eight of the more frequently-occurring charge-exchange combinations. Each entry gives the isotope and element identification, a coded explanation of the line formation, the apparent mass and square root of the apparent mass to nine significant figures (when the mass is known to this accuracy) and the relative abundance. These tables prove to be a very useful complement to the Table of Atomic Masses compiled by R. L. Heath for the identification of mass spectrographic lines. The Heath table presents the lines of all elements in one continuous list, from the lowest to the highest apparent mass, and is very useful for making tentative line identifications. Our tables, because they are arranged by element, aid in identifying rapidly all lines due to the major elements of the sample and in confirming or rejecting tentative identifications much more conveniently. (Author)

AD-275 509 Div. 20, 25
(TISTP/WH) OTS price $10.50

Plesset, E. H., Associates, Inc., Los Angeles, Calif.
COLLISION CROSS SECTIONS; ATOMIC SCATTERING PROCESSES; HIGH RESOLUTION GROUND BASED SIMULTANEOUS MEASUREMENT OF IONOSPHERIC ELECTRON DENSITY AND COLLISION FREQUENCY. PART I.
Final rept.,
by Edward Gerjuoy, Frances Richey, and R. S. Wehner. 30 Jan 61, 1v. incl. illus. tables, 79 refs. (Rept. no. C25-61(U)75; TR-121)
(Contract AF 19(604)6187, Proj. 4618)
(AFCRL-531, pt. 1) Unclassified report

DESCRIPTORS: *Molecules, *Atoms, Nuclear spins, *Scattering, Reaction kinetics, *Inelastic scattering, Probability, Electrons, Ionosphere, *Atmospheric sounding, Ions, Density, Radar, High frequency.

Contents:
Collision Cross Sections: Formal Theory for Distinguishable Spinless Particles, by Edward Gerjuoy
Atomic Scattering Processes: Survey of Recent Progress, by Edward Gerjuoy
High Resolution Ground-Based Simultaneous Measurement of Ionospheric Electron Density and Collision Frequency, by Francis Richey and R. S. Wehner

AD-275 528 Div. 20
(TISTB/AW) OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 57.
Rept. for 1-30 Apr 62.
15 May 62, 31p. (REIC Accession list no. 57)
(Contract AF 33(616)7375; Continuation of Contract AF 33(616)6564)
Unclassified report

DESCRIPTORS: *Indexes, *Bibliography, *Radiation effects, *Radiation damage, Organic compounds, Inorganic substances, Electronic equipment, Polymers, Metals, Ceramic materials, Dosimetry, Space flight, Solar cells, Semiconductors, Germanium, Detectors, Hazards, Radioactive fall-out.

AD-275 551 Div. 20
(TISTP/WH) OTS price $3.60

Army Ordnance Missile Command, Redstone Arsenal, Huntsville, Ala.
NEUTRONS PARTIAL CROSS SECTION STUDIES,
by D. R. Koehler and W. L. Alford. 10 Apr 62, 34p. incl. illus. 33 refs. (Rept. no. RR-TR-62-1)
(DA Proj. no. 599-04-002)
Unclassified report

DESCRIPTORS: *Neutrino cross sections, Scattering, *Radioactive isotopes, Zirconium, Zinc, Bromine, Silver, Antimony, Praseodymium compounds, Niobium.

The (n,2n) excitation functions are given for Zn-64, Br-79, Ag-107, Sb-121, and Pr-141. Evidence is presented for a 7+ isomeric state in Y-90 at 0.685 Mev. Zr-90(n,p)Y-90m and Nb-93(n,a) Y-90m cross sections for 14.7-Mev neutrons are reported to be 12 ± 4 mb and 5 ± 2 mb, respectively. The experimental cross section results were not in significant disagreement with the statistical model theoretical results, although in general, the experimental valves are somewhat smaller than the theory predicts. (Author)

AD-275 600 Div. 20
(TISTP/WH) OTS price $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ATTENUATION OF GAMMA RADIATION IN A TWO-LEGGED 11-INCH RECTANGULAR DUCT,
by D. W. Green. 2 May 62, 52p. incl. illus. 6 refs. (Technical rept. no. 195)
Unclassified report

DESCRIPTORS: *Gamma rays, Attenuation, Concrete, Lead, Scattering, Cobalt, *Radioactive isotopes, Shielding.

Results are presented of experiments carried out with an 11 x 11-inch duct in concrete with one right-angle bend, using Co-60 as a gamma-ray source. Experiments cover the effects of moving the source and detector off the centerline position, of replacing the inside concrete corner lip with one of lead, and of removing various scattering areas in the corner. Measured values of attenuation factors for the corner and second leg

are compared with calculated values, using the LeDoux-Chilton analysis. The comparisons suggest that the analysis provides an adequate treatment of the single-scatter effect in the duct. Multiple-scatter effects, however, which are not taken into account by the analysis, apparently are responsible for approximately half of the radiation reaching the detector. An empirical expression is obtained which adequately represents most of the experimental results of duct measurements available at the present time. (Author)

AD-275 737 Div. 20, 25
(TISTP/MFA) OTS price $13.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ACCELERATORS, COLLECTION OF ARTICLES.
27 Apr 62, 183p. incl. illus. tables, refs.
(Trans. no. FTD-TT-61-242 of Izdatel'stvo Gosudarstvennogo Komiteta Soveta Ministrov SSSR Po Ispol' zovaniyu Atomnoy Energii, Moskva:pp. 1-163, 1960)
Unclassified report

DESCRIPTORS: *Particle accelerators, *Particle beams, *Particle trajectories, Electron accelerators, Betatrons, Ion accelerators, Electromagnetic fields, Particles, Motion, Oscillation, Perturbation theory, Partial differential equations, Phase measurement, Microwaves, Mass spectrometers.

Theoretical and experimental studies on linear electron accelerators, betatrons and synchrotrons, and work on ion sources for cyclotrons are described. The cycle of theoretical studies on particle capture under acceleration conditions in betatrons and synchrotrons contains mathematical solutions to this problem, taking into account questions of collective particle interaction in the beam, and the inductive properties of this beam at the instant of its appearance and its cut-off. The series of experimental investigations deal with various problems of measurements at microwave frequencies, elements of linear electron accelerators and cyclotrons, and a special study of a linear-cyclic accelerator (the elutron), proposed several years ago. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-275 601 Div. 22
(TISTW/RD) OTS price $11.50

Atlantic Research Corp., Alexandria, Va.
SIMPLIFIED SOLUTIONS TO THE INTERIOR BALLISTIC PROBLEMS OF CARTRIDGE ACTUATED DEVICES,
by W. H. Holter. 18 May 62, 1v. incl. illus. tables.
(Contract N178-7503)
(NWL rept. no. 1752) Unclassified report

DESCRIPTORS: *Cartridges, *Ejector cartridges, *Interior ballistics, Pressure, Velocity, Combustion, Equations, Motion, Mathematical analysis.

Research concerns the derivation of approximate analytic solutions to the interior ballistic equations of cartridge-actuated devices. A unique feature of the system is that linear burning rates need not be assumed. The solutions are presented in graphical form, thereby permitting the rapid solution to a variety of ballistic problems. Several sample problems are included. (Author)

AD-275 776 Div. 22
(TISTW/RD) OTS price $4.60

Naval Weapons Evaluation Facility, Albuquerque, N. Mex.
OBJECTIVE MONITORING,
by R. W. Muir. 1 Jan 62, 44p. incl. table.
(NAVWEPS rept. no. 7855)
Unclassified report

DESCRIPTORS: *Naval ordnance, *Weapons, *Monitors, Reliability, Mathematical prediction, Safety, Costs, Probability, Statistical analysis, Mathematical analysis.

Means that consider cost and reliability to determine whether monitoring of weapons in service is justified and to determine the method of monitoring when it is justified are discussed analytically for the consideration of weapon designers. (Author)

AD-275 882 Div. 22, 3
(TISTW/JRG) OTS price $1.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF SHELL, ILLUMINATING, 155-MM, T72E2.
25 Apr 62, 9p. illus. table (Proj. ATB 1-212)
Unclassified report

DESCRIPTORS: Howitzers, *Illuminating projectiles, *Pyrotechnics, *Projectiles, Canister projectiles, Propelling charges, Primers, Time delay fuzes, Climatic factors, Temperature, Tests.

The test shells and fuzes were stored outdoors in tactical packaging and exposed to prevailing weather conditions until fired, cold-soaking at temperatures ranging from 48 F to -67 F. Testing was conducted at ambient temperatures ranging from 0 F to -67 F. Shells were fired in conjunction with testing of the M1 155-mm howitzers.

Thirty-eight of the test shells functioned as live candles. Two test shells failed to function as live candles because of fuze failures. The canisters of these two test shells burned on the ground. The test shells were satisfactory with respect to ease of preparation, accuracy and precision, crew comfort and safety, compatibility with related equipment, functional suitability, and durability and reliability. The test shells met the military characteristics in all respects. (Author)

23. PERSONNEL AND TRAINING

AD-275 863 Div. 23
(TISTB/LH) OTS price $2.25

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
INDOCTRINATION PROCEDURES FOR PERSONNEL ASSIGNED TO ARCTIC SITES,
by L. R. Eilbert. Apr 61, 97p. incl. tables, 20 refs. (AAL TR 60-12)
(Proj. 8243-10; In cooperation with American Institute for Research, Pittsburgh, Pa.)
Unclassified report

DESCRIPTORS: *Military personnel, *Arctic regions, Air Force, *Training, Safety, Physical fitness, Public health, Exposure.

This study is to develop an indoctrination course designed to prepare Air Force enlisted personnel for assignment to remote AC and W sites in Alaska. An indoctrination course consisting of a thorough briefing of site conditions was developed. The briefing was presented by an officer with firsthand knowledge of site conditions and in addition, 35 millimeter colored slides were used to augment the presentation. The existing site briefing consisted of lectures on Ground Safety, Fire Prevention, and Wild Life, plus a movie entitled Personal Health in Snow and Cold. The newly developed indoctrination course was compared with the existing course, and it was found that men attending the new course expressed more positive attitudes toward their site assignments immediately after the presentation, than did those who attended the existing site briefing. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

No Entries

Division 25 - PHYSICS

25. PHYSICS

AD-275 359 Div. 25, 4
(TISTM/TCG) OTS price $1.60

Princeton U., N. J.
A CALORIMETRIC PROBE FOR THE MEASUREMENT OF HIGH GAS TEMPERATURES.
Technical rept.,
by Jerry Grey and Paul F. Jacobs. Apr 62, 15p. incl. illus. 5 refs. (Aeronautical Engineering Lab. rept. no. 602)
(Contract Nonr-185831)
Unclassified report

DESCRIPTORS: *Calorimeters, Measurement, Temperature, *Specific heat, *Enthalpy, Velocity, Plasma jets, Exhaust gases, *Argon, *Helium, Supersonic flow, Calibration, Mass energy relation, Thermodynamics, Gases, Sampling.

A water-cooled gas sampling probe capable of steady-state operation at 15,000 K and one atmosphere was developed. Temperature is measured by a unique calorimetry technique susceptible to high-accuracy calibration under arcjet conditions. The probe also measures velocity and chemical compositions and, because of its small size (approximately 1/8 in. OD) is capable of accurate local measurements in the presence of severe gas-stream property gradients. Calibrations in the partially ionized Ar-He environment of an arcjet exhaust indicated an average agreement with mass and energy balance criteria within 1/2%, and a standard deviation from the mean of less than 3%. (Author)

AD-275 367 Div. 25
(TISTP/MFA) OTS price $5.60

Adelphi Coll., Garden City, N. Y.
TRANSVERSE MAGNETOHYDRODYNAMIC FLOW PAST A SEMI-INFINITE PLATE,
by James Radlow and William B. Ericson. Feb 62, 51p. 10 refs. (AGM rept. no. 103)
(Contract Nonr-336001, Proj. NR 041-252)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, Fluid flow, Viscosity, Magnetic fields, *Magnetic susceptibility, Velocity, Mathematical analysis, Nonlinear systems, Perturbation theory, Partial differential equations, Integral transforms, Factor analysis, Sheets.

An investigation of the steady state flow of a viscous, incompressible conducting fluid over a semi-infinite plate parallel to the free stream flow, in the presence of a magnetic field perpendicular to the plate is presented. The electromagnetic interaction between the free stream flow and the applied magnetic field is nullified by an imposed electric field perpendicular to the flow and parallel to the plate. The governing physical quantities V (velocity of the resulting flow) and H (induced magnetic field) occur nonlinearly in the basic equations. The underlying hypothesis that the transverse induced field may be well approximated (in the convective term) by a constant multiple of the applied field is justified by physical considerations and is moreover validated by the results of the analysis. (Author)

AD-275 383 Div. 25, 17
(TISTM/BRW) OTS price $1.25

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
A THEORY OF CUMULATIVE DAMAGE IN FATIGUE.
Rept. on Kinetics of Deformation and Fracture,
by S. R. Valluri. Dec 61, 31p. incl. illus. table, 18 refs.
(Contract AF 33(616)6270, Proj. 7024)
(ARL-182) Unclassified report

DESCRIPTORS: Metals, *Fatigue (Mechanics), Theory, Fracture (Mechanics), Propagation, Stresses, Elasticity, Plasticity, Loading, Acoustics, Vibration, Frequency, Statistical functions, Probability, Lattices, Deformation, Alloys, Tensile properties.

A theory of cumulative damage is presented which is quantitative and is capable of explaining the effect of stress magnitude and is sensitive to the order of application of stress. The theory is based on a model of fatigue obtained from the elasto-plastic theory of cracks and on concepts from the dislocation theory of metals. The fundamental idea involved is the estimation of the length of a dominant crack that is presumed to grow during progressive fatigue whether due to a single stress or multiple stress loading. By referring all damage to the growth of this crack it is possible to treat the cumulative damage as a logical extension of the engineering theory of fatigue without making other arbitrary assumptions. Applications of the theory to multi-step loading, program type loading, sequential random loading, and completely random loading have been discussed in a quantitative manner. Aspects of extension of the theory to acoustic fatigue and some implicit limitations of the theory are also briefly discussed. The basic information necessary for the quantitative application of the theory is a statistically well defined stress versus number of cycle curve of fatigue. (Author)

AD-275 388 Div. 25, 15
(TISTP/MFA) OTS price $4.60

California U., Berkeley.
UNIQUENESS OF THE SCATTERED WAVE IN QUANTUM MECHANICS (I). A DERIVATION OF THE NONRELATIVISTIC COULOMB GREEN'S FUNCTION (II),
by Charles P. Luehr. Mar 62, 41p. 6 refs.
(Technical rept. no. 9)
(Contract Nonr-22260)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Scattering, *Relativity theory, *Green's function, Wave analysis, Potential theory, Potential scattering, Operators (Mathematics), Partial differential equations, Integral equations, Particles.

Growth properties of solutions of the n-dimensional wave equation (delta + q(x))u(x)=0 are discussed and uniqueness theorems are proved for solutions satisfying an outgoing wave condition. The results imply the uniqueness of the scattered wave in quantum mechanics in which the potential is the sum of a Coulomb potential and a continuous potential of order O(1/r squared) at infinity. Another method for deriving an integral representation of the nonrelativistic Coulomb Green's function is demonstrated. By this method the Green's function for the n-dimensional wave equation (delta + k squared - 1/2 kcr)u(x)=0 is derived, and for n=3 it agrees with the result of Wichmann and Woo. (Author)

AD-275 389 Div. 25
(TISTP/MFA) OTS price $7.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
STUDY OF INFRARED EMISSION IN HEATED AIR.
Annual rept. (Final), July 60-June 61,
by Walter H. Wurster and Paul V. Marrone.
July 61, 49p. illus. 26 refs. (Rept. no. QM-1373-A-4)
(Subcontract to Bendix Systems Div., Bendix Corp., Ann Arbor, Mich., Contracts DA 11-022-ORD-3130 and SD-59-2)

Unclassified report

DESCRIPTORS: *Infrared radiation, *Re-entry vehicles, *Shock waves, *Air, Recombination reactions, Shock tubes, Photomultipliers, Spectrographic analysis, Aerodynamics, Thermodynamics, Gas ionization, Velocity, Density, Temperature, Hypersonic flow, Vibration, Harmonic oscillators, Plasma physics.

A comprehensive program of the radiation from re-entry bodies is presented. The program is divided into two phases: the experimental determination of the radiative properties of the optically-active gaseous species, and the analysis of the blunt-body flow field, in which the finite rate chemistry of the air is coupled with the aerodynamics of the flow. Two particular radiating systems were studied, and the results are reported. Measurements have been completed on the continuum radiation from recombination reactions in the wavelength range 0.5 to 1.0 microns. The value of the rate constant at 3750 K is some 20 times lower than that measured at room temperature. Spectral intensities of this radiation are given. Two bow-shock solutions are presented: a typical high-altitude re-entry condition (i.e. M = 22 at 200,000 feet altitude) and a hypersonic tunnel test configuration. Results for both examples are presented in graphical form and are discussed in detail. (Author)

AD-275 390 Div. 25
(TISTP/MFA) OTS price $11.00

Cooke Engineering Co., Alexandria, Va.
BURIED CABLE RADIATION STUDIES.
Final rept.,
by A. A. Carterette and S. Weintraub. 15 Apr 61, 1v. incl. illus., tables, 35 refs.
(Contract NBy 17827)

Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Electric cables, Transmission lines, Interference, Attenuation, *Coal, Magnetic susceptibility, Antennas, Dielectrics, Radiofrequency cables, Magnetite, Earth, Electrical conductance, Waveguides, Tests, Measurement, Feasibility studies.

Criteria for measuring and suppressing electromagnetic interference from underground cables are given. Studies have shown that a high degree of attenuation of electromagnetic energy injected into a cable which is properly buried in a trench subsequently filled with alternate layers of coke and anthracite coal will be obtained. This can be done with practical trench dimensions, i.e., a depth not exceeding six feet and a width not exceeding two feet. The use of magnetite as part of the fill may give improved attenuation, however, its use would in general, be less practical because of limited availability. Recommendations for improving the sensitivity of instruments used to measure electromagnetic interference are made. Techniques for applying radio frequency energy to power lines and techniques for measuring radio frequency energy emanating from power lines are discussed. (Author)

AD-275 396 Div. 25
(TISTP/MFA) OTS price $2.60

Ohio State U. Research Foundation, Columbus.
THE VARIATION OF CRITICAL CURRENT IN SUPERCONDUCTING ALLOYS WITH FIELD DIRECTION,
by J. G. Daunt, M. Kreitman and others. May 62, 11p. illus. 13 refs. (Technical rept. no. 5)
(Contract N6onr-49520, Proj. NR 018-412; In cooperation with Eidgenossische Technische Hochschule, Zurich)

Unclassified report

DESCRIPTORS: *Superconductivity, *Alloys, *Wire, Lead, Bismuth, Molybdenum, Rhenium, Magnetic fields, Resistance, Thermodynamics, Solenoids, Bessel functions.

The critical current in Mo-Re and Pb-Bi wires was examined as a function of field orientation in strong magnetic fields. The polar diagrams obtained resemble those expected theoretically for thick pure wires. As a result, it is suggested that it may be a local criterion, rather than the total energy of the superconductive filaments, which determine the conditions for reappearance of resistivity. (Author)

AD-275 413 Div. 25
(TISTW/RD) OTS price $4.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
PARTICLE PHASE THERMAL EMISSION OF ROCKET EXHAUST,
by J. Santomieri. 24 Apr 62, 39p. incl. illus. 5 refs. (Rept. no. FS-62TN-1030; BSC 30872)
(Contract AF 04(694)26)

Unclassified report

DESCRIPTORS: *Particles, *Blackbody radiation, *Thermal radiation, Thermal behavior, Exhaust gases, Rockets, Hypervelocity vehicles, Solid rocket propellants, Cesium compounds, Nitrates, Aluminum.

An analysis of particle continuum radiation was made. A small cesium-nitrate aluminum solid propellant rocket attached to an ICBM re-entry vehicle was studied in particular. This effort constitutes one part of an integrated effort to determine the radiative properties of the exhaust products of a rocket system associated with a hypervelocity vehicle. (Author)

AD-275 422 Div. 25, 8
(TISTE/CAM) OTS price $6.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 9, 16 Dec 61-15 Mar 62,
by R. Novick. 15 Mar 62, 66p. incl. illus. 35 refs. (Rept. no. CU-3-62)
(Contract DA 36-039-sc-78330)

Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Lasers, *Electron tubes, *Masers, *Solid state physics, *Magnetrons, *Cryogenics, Ion beams, Microwaves, Magnets, Helium, Radio astronomy, Microwave spectroscopy, Atomic spectrum, Molecular spectroscopy, Ruby, Magnetic fields, Superconductors, Planetary atmosphere, Simulation, Lithium, Hyperfine structure, Sodium, Rubidium, Cadmium, Calcium, Strontium, Spectrographic analysis, Measurement.

Several modifications of the 30-ft beam apparatus which will be used to measure the lifetime of the metastable state of helium ions are described. Level crossing experiments utilizing optical methods (double resonance methods) have been employed to measure the hyperfine Zeeman structure of isotopes of zinc, sodium, rubidium, and cadmium. Complete results are given for the radiative lifetime of the 3p1 state of cadmium. A new experiment for measuring the electronic fine structure of ionized lithium is under way. Similar experiments are proposed for various states of calcium and strontium. Several radioactive species were studied by the double resonance technique, principally cadmium and calcium. Progress is described on several molecular physics projects, including molecular beams experiments employing velocity selection and electric resonance, and microwave and maser spectroscopy. Several advances in the optical maser program are described. (Author)

AD-275 438 Div. 25
(TISTP/MFA) OTS price $7.60

Electronic Communications, Inc., Timonium, Md.
SELECTED SURFACE WAVE EXCITATION STUDIES,
by M. Cohn and M. J. King. Mar 62, 73p. incl. illus. 6 refs. (Scientific rept. no. 3)
(Contract AF 19(604)5475)
(AFCRL 62-173) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Wave transmission, Surfaces, Excitation, Antennas, *Antenna radiation patterns, Dielectrics, Waveguides, Rods, Bessel functions, Integral transforms, Partial differential equations, Vector analysis, Dipole antennas.

Surface wave excitation phenomena are presented. Part I is an analysis to determine the efficiency with which the dominant HE11 (dipole) mode can be launched onto a circular cross-section dielectric rod. The source consists of an infinitesimally thin magnetic ring source, which is concentric with and has a larger radius than the dielectric rod, and whose magnitude is a sinusoidal function of the peripheral angle. Part II contains an analysis to determine the efficiency with which the dominant TM01 mode (Sommerfeld Wave) can be launched onto a finite conductivity circular rod. The source consists of an infinitesimally thin uniform magnetic ring source which is concentric with and has a larger radius than the rod. In each of these analyses, equations were derived which yield the radiation and surface wave fields as a function of frequency, geometry, and the material constants of the surface wave guiding structure. Curves of the computed launching efficiencies and plots of the far field radiation patterns are presented. Methods of physically realizing the postulated excitation conditions for each of the problems are described. (Author)

AD-275 440 Div. 25
(TISTB/AW) OTS price $3.60

HRB-Singer, Inc., State College, Pa.
MASERS, LASERS, AND IRASERS: A BIBLIOGRAPHY.
May 62, 28p. 338 refs. (Rept. no. B-1)
Unclassified report

DESCRIPTORS: *Bibliography, *Masers, Theory, *Parametric amplifiers, *Microwave amplifiers, Ruby, Dioxides, Titanium compounds, Relaxation time, USSR.

The bibliography covers the period from 1959 to the present and contains bibliographies, books, journal articles and items specifically applicable to the U.S.S.R. Books are cited alphabetically by author; journal articles are cited alphabetically by title. Complete bibliographic information is provided when available. The following sources were used for compilation: Chemical Abstracts, Cumulative Book Index, Engineering Index, Library of Congress (Russian Acc. List), OTS (Technical Abstract Bulletin), Science Abstracts (Electrical Engineering and Physics), Solid State Abstracts, and Subject Guide to Books in Print. A supplement will be published in the near future. The supplement will list the documents which are contained in the resources of ASTIA; will be arranged alphabetically by subject; and will be classified. (Author)

AD-275 444 Div. 25, 7
(TISTE/CDM) OTS price $5.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
EXPERIMENTAL STUDIES OF NON-EQUILIBRIUM IONIZATION IN AN MHD GENERATOR,
by F. A. Robben. 20 Feb 62, 52p. incl. illus. tables, 16 refs. (Rept. no. R62SD13)
(Contract AF 33(616)7539)
Unclassified report

DESCRIPTORS: *Electric power production, *Magnetohydrodynamics, *Generators, *Plasma physics, *Gas ionization, Tests, Mathematical analysis, Conductivity, Magnetic fields, Ionization.

Non-thermal ionization in a magnetohydrodynamic (MHD) generator is considered. Equations giving the conductivity and electron energy of a moving gas in a magnetic field are derived, assuming only elastic collisions for electron energy losses, and assuming that the ionization is in a pseudo-equilibrium with the electron temperature. A series of experiments were made which in the absence of a magnetic field demonstrated non-equilibrium conductivity but in the presence of a magnetic field indicated a large sheath voltage drop. It appeared that the small conductivity observed with a magnetic field was due to non-equilibrium effects. (Author)

AD-275 448 Div. 25
(TISTM/EJH) OTS price $3.60

General Electric Co., Schenectady, N. Y.
RESEARCH ON CdTe.
Quarterly progress rept. no. 4, 1 Feb-30 Apr 62, by R. E. Halsted, M. R. Lorenz, and D. T. F. Marple. 30 Apr 62, 29p. incl. illus. table, refs.
(Contract AF 33(616)8264)
Unclassified report

DESCRIPTORS: *Semiconductors, *Single crystals, *Intermetallic compounds, *Cadmium compounds, *Tellurides, Solid state physics, Optics, Light, Polarization, Reflection, Infrared radiation, Solids, Vapors, Thermodynamics, High temperature research, Impurities.

This report includes:
THE SOLID-VAPOR EQUILIBRIUM OF CdTe, by M. R. Lorenz. 1962, 10p. incl. illus. table.

Optical studies on CdTe single crystals: Construction and testing of apparatus for the Faraday rotation measurements were completed. Reflectance (in the 16 to 35 micron range) and Faraday effect measurements on a series of pure and n-type doped CdTe single crystals are reported. Effective mass values of 0.122, 0.114, and 0.116 are listed. Solid-vapor equilibrium of CdTe: The solid-vapor equilibrium of CdTe and its gaseous component species was investigated from 812 to 1051C. A change in enthalpy of 68.5 K cal/mole and an entropy change of 45.8 cal/deg mole was calculated. Extrapolation to the maximum m.p. indicated a minimum pressure of 0.287 atm Cd and 0.144 atm Te2 near 1092C for the 3-phase equilibrium.

AD-275 459 Div. 25, 17
(TISTM/EJH) OTS price $8.60

Illinois U., Urbana.
ELECTRICAL BEHAVIOR OF PASSIVE IRON (II).
Technical rept. no. 7 on Protection Against Corrosion,
by J. L. Ord and J. H. Bartlett. 20 Apr 62, 88p. incl. illus. table, 18 refs.
(Contract DA 11-022-ORD-3442, Proj. 5B-01-004)
(AROD rept. no. 2694:1) Unclassified report

DESCRIPTORS: *Iron, *Electrodes, Anodes (Electrolytic cells), Electrical properties, Corrosion, Electrolytic cells, Electrolytes, Sulfuric acid, Electric currents, Electric potential, Coatings, Thin films, Adsorption, *Surfaces, Theory.

The behavior of a passive Fe electrode was studied in an attempt to resolve the conflicting layer and adsorption theories of passivity. Steady-state current was independent of potential over most of the passive region. Transient measurements showed that current depends exponentially on potential, and established capacitance as a parameter of the system. The parameters of the exponential dependence were determined by analyzing the shape of capacitive transients. The parameters measured experimentally determined the parameters of the layer and the activation barrier. The overpotential parameters had a significant current dependence. The kinetics of formation and removal of the layer were studied. It was found that for anodic currents the rate of change of layer thickness is proportional to the difference between the anodic current and the steady-state current. For cathodic currents the electrode is activated by another mechanism before significant change in thickness is observed. Transient and a-c measurements of capacitance showed a correlation. (Author)

AD-275 460 Div. 25, 30
(TISTW/DLW) OTS price $1.10

Institute of Science and Tech., U. of Michigan, Ann Arbor.
MEASUREMENT OF LASER OUTPUT BY LIGHT PRESSURE,
by J. J. Cook, W. L. Flowers, and C. B. Arnold. May 62, 3p. incl. illus. 1 ref. (Rept. no. 2900-350-1)
(Contract DA 36-039-sc-78801, Proj. 3D5801001)
Unclassified report

DESCRIPTORS: *Lasers, *Oscillators, *Light pulses, *Test facilities, Light, Intensity, Pressure, Reflection, Measurement, Light transmission.

A practical system is demonstrated that can be constructed to measure the pressure of a laser pulse on a reflecting surface, and hence the total energy of the pulse. By proper selection of coatings, such a surface can be made very highly reflecting, and thus suffer no significant deterioration. If appropriate system characteristics are chosen, there appears to be no practical limitation on the maximum measurable pulse energy. The present discussion treats only pulsed output, but the method applies equally well to lasers producing c-w output. (Author)

AD-275 462 Div. 25
(TISTP/MFA) OTS price $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
THE FIRST-ORDER MHD FLOW ABOUT A MAGNETIZED SPHERE,
by Vivian O'Brien. Feb 62, 31p. incl. illus. 17 refs. (Rept. no. CM-1011)
(Contract NOrd-7386)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Electromagnetic fields, *Fluid flow, *Spheres, Reynolds number, Velocity, Viscosity, Axially symmetric flow, Vortices, Plasma physics, Perturbation theory, Drag, Equations, Functions.

When both the velocity vector field and the magnetic vector field are axi-symmetric with no azimuthal components the system of equations for steady magnetohydrodynamic problems reduces to two scalar equations. These are used to find the flow field and magnetic field about a uniformly magnetized sphere correct to the first-order in the parameters: Hartmann number, Reynolds number and magnetic Reynolds number. The first complete first-order field gives Drag = Stokes drag (1 + 3/8 Re + 1/150 M squared). A similar relation is predicted for all first-order MHD flows about symmetric magnetized bodies. The multiplier of Re depends upon body shape; that of M squared depends upon both body shape and magnetic field. (Author)

AD-275 472 Div. 25, 8
(TISTE/CDM) OTS price $4.60

Little, Arthur D., Inc., Cambridge, Mass.
SUPERCONDUCTIVE EFFECTS IN THIN FILMS.
Interim engineering rept. no. 1, 15 Jan-15 Apr 62,
by S. Shapiro. 15 May 62, 36p. incl. illus. 8 refs. (Rept. no. C-64380)
(Contract AF 33(657)7915)
Unclassified report

DESCRIPTORS: *Thin films, *Superconductivity, *Metal films, *Electronic equipment, *Detectors, *Superconductors, *Metallic crystals, Feasibility studies, Test equipment, Tests, Radiofrequency, Aluminum, Manufacturing methods, Crystals.

The feasibility of using the superconductive properties of certain thin film configurations to perform electronic functions was studied. Particular attention was paid to the use of thin film configurations involving electron tunneling

between superconductors. The effect of crystalline anisotropy on the tunneling current vs voltage characteristic is being examined. Preliminary results were obtained using an aluminum tricrystal which contains in one specimen three single crystals each having as its surface one of the three principal crystallographic planes. Details of the sample preparation and the experimental apparatus are given. In another experiment, a thin film tunneling assembly was used as an RF detector to frequencies as high as 65 mc. The detection was most efficient at points on the dc characteristic of sharpest nonlinearity. (Author)

AD-275 479 Div. 25
(TISTP/TL) OTS price $4.60

Microwave Lab., Stanford U., Calif.
PUMPING POWER CONSIDERATIONS IN AN OPTICAL MASER.
Technical rept.,
by O. Svelto. Apr 62, 29p. incl. illus. 6 refs.
(ML rept. no. 902)
(Contract Nonr-22548, Proj. NR 373-361)
Unclassified report

DESCRIPTORS: *Lasers, *Masers, Optics, *Ruby, Rods, Absorption, Measurement, Photoflash bulbs, Power, Refractive index, Blackbody radiation.

The theoretical efficiency of various pumping power systems that have been adopted in optical masers is studied. A thermodynamical method is used to calculate the power transferred from the flashtube to the maser material. A general expression is obtained which allows one to calculate the total power and the power per unit area of the flashtube needed, for a given power absorption by the active rod. When the rod is surrounded by a sheath with an index of refraction equal to or greater than that of the rod, the power per unit area of the flashtube is lowered at best by the factor n, where n is the index of refraction of the rod. The total power required from the flashtube is not affected by the sheath. The most efficient case occurs when the pumping power is allowed to enter the active rod from all directions. In this case the necessary power per unit area of the flashtube is reduced by a factor n squared with respect to the case of a simple rod. (Author)

AD-275 484 Div. 25, 8
(TISTP/WH) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
A METHOD OF VIRTUAL DISPLACEMENTS FOR ELECTROMECHANICAL SYSTEMS, INCLUDING THOSE WHICH CONTAIN PIEZOELECTRIC CRYSTALS AND MAGNETOSTRICTION ELEMENTS,
by Prescott D. Crout. May 62, 28p. incl. illus.
(NOTS TP 2703)
Unclassified report

DESCRIPTORS: *Piezoelectric crystals, *Magnetostrictive element, *Transducers, Sonar signals, Magnetic fields, Electric fields, *Electrical networks, Partial differential equations, Integration.

A method of virtual displacements is developed for obtaining the transient or steady state behavior of electromechanical systems which may include piezoelectric crystals and magnetostrictive material. This method involves the association of a number of electric current modes and mechanical displacement modes with generalized coordinates, and gives a set of equations, one for each mode, which resembles the mesh equations of a lumped network. A reciprocity theorem is derived, which is applied to a sonar transducer, and which is of fundamental importance in the calculation of sonar target return. (Author)

AD-275 485 Div. 25
(TISTP/TL) OTS price $9.10

Naval Ordnance Lab., White Oak, Md.
FOUNDATIONAL RESEARCH.
31 Dec 61, 102p. incl. illus. tables, refs.
(Rept. no. NOLR 1243, pt. 1)
Unclassified report

DESCRIPTORS: *Solid state physics, *Lasers, Magnetism, Metallurgy, *Tin compounds, *Tellurides, Electrical properties, Optics, *Semiconductors, Intermetallic compounds, Hall effect, Surfaces, Transport properties, Thin films, Photoconductivity, *Magnetic materials, *Magnetostriction, Magnetic properties, *Nuclear magnetic resonance, *Liquids, Transducers, Sound, *High pressure research, *Quantum mechanics, Blunt bodies, Partial differential equations, Aerodynamics, Gases, Ionization, Fluid flow.

AD-275 488 Div. 25
(TISTP/TL) OTS price $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PLASMA MAGNETOHYDRODYNAMICS AND ENERGY CONVERSION.
Technical progress rept. no. 6 for period ending 28 Feb 62 on Magnetohydrodynamics and Energy Conversion,
by E. N. Carabateas, J. A. Fay and others.
15 Mar 62, 28p. incl. illus.
(Contract AF 33(616)7624 and NSF Grant G-9330)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Plasma physics, Fluid flow, *Continuum mechanics, Kinetic theory, Electric fields, *Plasma jets, Cylindrical bodies, Electrodes, Wave analysis, Space charges, Wave transmission, Direct current, Electric discharges, Gases, Air, Argon, Helium, Hydrogen, Nitrogen, Thermionic emission, Fuel cells, Light, Intensity, Time, Traveling wave tubes, Amplifiers, Special functions, Shock waves, Energy.

The dynamics of a plane jet of fluid stressed perpendicularly by an electric field is investigated. The objective is to show the conditions for which this configuration can be made to give traveling-wave amplification of a signal that is impressed on the jet. In this case there would be a signal coupled to the flow on the upstream (input) end of the device and an output coupling at the downstream end. In the region between, the energy of the impressed ac signal would grow at the expense of the kinetic-flow energy. The interaction considered is superficial in nature. If there is to be a significant interchange of kinetic-flow energy and ac energy stored in the electric field, the jet must offer a high surface-to-volume ratio. The planar configuration chosen here offers this advantage and is also easily tractable. The static electric field is impressed by means of parallel plates of high conductivity. (Author)

AD-275 490 Div. 25, 30
(TISTP/GRW) OTS price $1.50

Massachusetts Inst. of Tech., Cambridge.
OPTICAL METHODS OF MEASURING PLASMA JET TEMPERATURES. PART II. MEASUREMENT BY PHOTOELECTRIC PYROMETRY.
Rept. for Oct 60-Aug 61, on Experimental Techniques for Materials Research,
by H. C. Hottel, G. C. Williams and others.
Feb 62, 46p. incl. illus. tables, 77 refs.
(Contract AF 33(616)6570, Proj. 7364)
(WADD TR 60-676, pt. 2) Unclassified report

DESCRIPTORS: *Gases, *Plasma jets, *High temperature research, Photomultipliers, Optical analysis, Measurement, Instrumentation, Photoelectric pyrometers.

The application of two-path optical pyrometry to measurement of plasma jet temperature was studied from both theoretical and practical aspects. A pyrometer was constructed with its detection system consisting of a selected 1P21 photomultiplier associated with an electronic filter tuned to 1 c. Comparison between the unknown source and a calibrated filament is made at this frequency which is chosen to give optimum signal-to-noise ratio. The transparency of high temperature plasma necessitates the use of an opacifier if the two-path technique is to be employed with any accuracy. The use of sodium as a non-grey temperature indicating probe was investigated. The measurememt of integral radiancy is made almost monochromatic by passage through a narrow cut interference filter centered on 5892 angstroms, having a halfwidth of 7.5 angstroms. This enables the sodium D line doublet to be selected uniquely but renders the Beer's law expression inapplicable unless the shape of the emission line is known. The theories of spectral line broadening suggested the use of a theory by Lindholm to give this data and it was applied to the interpretation of the pyrometer readings. (Author)

AD-275 500 Div. 25, 22
(TISTM/BRW) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
PROPAGATION OF COMPRESSIVE STRESSES THROUGH A PLASTICALLY DEFORMING MATERIAL,
by Marvin E. Backman. Apr 62, 34p. incl. illus. 12 refs. (NOTS TP 2896)
(NAVWEPS rept. no. 7896)
Unclassified report

DESCRIPTORS: *Solids, Plasticity, Deformation, *Compression shock, *Shock waves, Propagation, Solid state physics, Continuum mechanics, Stresses, Impact shock, Wave analysis, Aluminum alloys, Iron.

The present report considers the application of this material description to those problems of impact and explosive phenomena in which plane-wave analyses are applicable. The material description is first used in a discussion of the shock conditions in the material and the continuous conditions behind a shock. The general problem of shock-wave interaction with the continuous motion behind a shock is then considered and a particular approximate method of treating these interactions is derived. A numerical solution is obtained for the impact at a plane surface with a second body of the same material. The material selected is aluminum for which the required data are available. The calculations were carried out by a 7090 IBM digital computer and the results are given in graphical form. (Author)

AD-275 512 Div. 25
(TISTP/MFA) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ELECTRON DENSITY PROFILE,
by Henry L. Bertoni. June 62, 26p. incl. illus. 11 refs. (Rept. no. PIBMRI-987-62)
(Contract AF 19(604)8070, Proj. 6692)
(AFCRL-62-421) Unclassified report

DESCRIPTORS: *Plasma physics, *Microwaves, *Electrons, *Density, Electromagnetic waves, Dielectric properties, Transport properties, Propagation, Gas discharges, Hydrogen, Electrodes, Oscilloscopes, Functions, Integral equations.

Two methods are presented for finding the electron density profile of a plasma which varies in one dimension only. They are based on phase measurements of a microwave signal reflected from the plasma when the plasma frequency is greater than the signal frequency. The methods are applicable when the dimensions of the plasma are such that the W K B approximation to the wave solution is valid. This includes dimensions sufficiently small so as to make time of flight measurements, as used in ionospheric studies, difficult or impractical. Using one of these methods, the electron density distribution in a pulsed hydrogen discharge between 6 x 8 in electrodes placed 18 in apart is found. (Author)

AD-275 538 Div. 25
(TISTP/WH) OTS price $2.60

Uppsala U. (Sweden).
THE NORMAL CONSTANTS OF MOTION IN QUANTUM MECHANICS TREATED BY PROJECTION TECHNIQUE,
by Per-Olov Lowdin. 15 Nov 61, 26p. 17 refs.
(Technical note no. 68)
(Contract AF 61(052)351)
(ARL-245) Unclassified report

DESCRIPTORS: *Quantum mechanics, Functions, Integral equations, Matrix algebra.

The normal operators Lambda commuting with the Hamiltonian form an important class of constants of motion. It is shown that the eigenfunctions to Lambda associated with different eigenvalues are not only orthogonal but also non-interacting with respect to the Hamiltonian. Every trial function may be resolved into eigenfunctions to Lambda by means of a projection operator formalism, which may also be used to split the secular equation into independent parts. The exchange phenomenon, the antisymmetry requirement, the angular momenta, the cyclic operators, and the translations are treated as illustrative examples. (Author)

AD-275 539 Div. 25, 8
(TISTP/WH) OTS price $2.60

University of Southern Calif. Engineering Center, Los Angeles.
THE DIFFRACTION OF WAVES BY AN ELLIPTICAL DIELECTRIC CYLINDER,
by C. Yeh. Mar 62, 23p. incl. illus. 7 refs.
(Rept. no. 82-203)
(Contract AF 19(604)6195, Proj. 4600)
(AFCRL 62-151) Unclassified report

DESCRIPTORS: *Microwaves, Diffraction, *Dielectrics, Scattering, Propagation, Lenses, *Optics.

The exact solution of the diffraction of waves by an elliptical dielectric cylinder is obtained. It is found that each expansion coefficient of the scattered or transmitted wave is coupled to all coefficients of the series expansion for the incident wave except when the elliptical cylinder degenerates to a circular one. Both polarizations of the incident wave are considered: one with the incident electric vector in the axial direction, and the other with the incident magnetic vector in the axial direction. (Author)

AD-275 542 Div. 25
(TISTM/EJH) OTS price $14.00

Wisconsin U., Madison.
THERMODYNAMIC PROPERTIES OF IONS AT HIGH TEMPERATURES.
Rept. for 1 Mar 59-30 June 61, on Research in Chemical Energetics,
by John W. Green, Duncan E. Poland and John L. Margrave. Dec 61, 83p. incl. tables, 10 refs.
(Contract AF 33(616)6384, Proj. 3048)
(ARL-191) Unclassified report

DESCRIPTORS: *Gases, *Gas ionization, *Ions, *Thermodynamics, Enthalpy, Entropy, Statistical functions, Mathematical analysis, *Tables, High temperature research.

Ideal gas thermodynamic functions were calculated with an IBM 650 computer for the elementary gaseous ions of charges +1, +2, +3 and +4 at close temperature intervals up to 51,000 K. The calculations are based on the atomic energy level data tabulated by the National Bureau of Standards. (Author)

AD-275 560 Div. 25, 17
(TISTP/WH) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE CONSTITUTIVE EQUATIONS FOR RATE SENSITIVE PLASTIC MATERIALS,
by P. Perzyna. Apr 62, 18p. incl. illus. 11 refs. (Technical rept. no. 76; Rept. no. C11-76)
(Contract Nonr-56210, Proj. NR-064-406)
Unclassified report

DESCRIPTORS: *Elasticity, *Plasticity, Viscosity, Metals, *Dynamics, Stresses, Loading, Wave transmission, Differential equations, Applied mathematics, Series.

The principal aim is to generalize the one-dimensional constitutive equations for rate-sensitive plastic materials to general states of stress. The dynamical yield conditions for elastic, visco-plastic materials are discussed and new relaxation functions are introduced. Solutions of the relaxation equations for such materials are given. (Author)

AD-275 561 Div. 25, 17
(TISTP/WH) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE STUDY OF THE DYNAMIC BEHAVIOR OF RATE SENSITIVE PLASTIC MATERIALS,
by P. Perzyna. May 62, 30p. incl. illus. 29 refs. (Technical rept. no. 77; Rept. no. C11-77)
(Contract Nonr-56210, Proj. NR-064-406)
Unclassified report

DESCRIPTORS: *Elasticity, *Plasticity, Viscosity, Metals, *Dynamics, Stresses, Loading, Wave transmission, Differential equations, Applied mathematics, Series.

The constitutive equations for rate sensitive plastic materials are discussed and the theoretical results are compared with recent experimental data. (Author)

AD-275 572 Div. 25, 30
(TISTP/MFA) OTS price $1.25

General Electric Co., Schenectady, N. Y.
DESORPTION OF MOLECULES BY ION-BEAM BOMBARDMENT.
Final technical rept. on Surface and Interface Phenomena of Matter,
by F. F. Carini and A. E. Judkins. Mar 62, 41p. incl. illus. tables, 41 refs.
(Contract AF 33(616)5291, Proj. 7072)
(ARL-62-305) Unclassified report

DESCRIPTORS: *Ion beams, *Bombardment, *Adsorption, Argon, Molecules, Deflection, Metal plates, Spectrophotometer, Oscilloscopes, Electrodes, Thermal radiation, Energy, Platinum, Copper, Stainless steel, *Instrumentation, Design, Stearates.

An experimental apparatus was devised and built which would produce ions of relatively low energy which would desorb molecules from a surface by bombardment. Monolayers of stearic acid and stearyl alcohol were desorbed from platinum, copper and stainless steel substrates. Argon ions were formed in an electron beam and the positive ions accelerated toward the negative electrode. The bombardment of the surface was continued at a constant energy level until desorption had become vanishing small. In this manner the threshold energy necessary for desorption was measured. (Author)

AD-275 577 Div. 25
(TISTP/TL) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
PARAMAGNETIC MASER OSCILLATOR ANALYSIS,
by S. Wang and J. R. Singer. 8 Sep 61, 16p. incl. illus. 11 refs. (Series no. 60, Issue no. 402)
(Contract AF 49(638)102)
(AFOSR-2340) Unclassified report

DESCRIPTORS: *Paramagnetic resonance, *Masers, *Oscillators, Analysis, Tuning circuits, Motion, Spin, Vector analysis, Nonlinear differential equations, Magnetic fields, Microwaves, Relaxation time, Amplitude modulation, Numerical analysis, Digital computers, Integral transforms, Quantum mechanics.

A physical and mathematical description of maser oscillator is given with emphasis upon explaining the structure of the output line shape. Several approaches to the problem are taken. A qualitative description of the motion of the spin vector is followed by a derivation of the equations pertinent to the interaction of a tuned circuit (microwave cavity) and precessing spins. The resultant equation is nonlinear. Approximate solutions are plotted as output amplitude vs time. In addition, the equations are solved with numerical solutions for specific experimental conditions by means of a digital computer. The numerical results are compared with experimental data. The field-swept oscillator line shapes are explained by the analysis, and the steady state oscillator is described. (Author)

AD-275 588 Div. 25
(TISTB/AW) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
EPITAXIAL GROWTH: AN ANNOTATED BIBLIOGRAPHY,
comp. by Helen M. Abbott. Mar 62, 33p. 78 refs.
(Special research bibliography no. SRB-62-3;
Rept. no. 5-10-62-5)
Unclassified report

DESCRIPTORS: *Bibliography, *Semiconductors, *Single crystals, Growth, Films, Thin films, Crystals, Vapor plating, Halogens, Transistors, Circuits, Metals, Foils, Oxidation, Microminiaturization, Germanium.

This annotated bibliography pertains to the epitaxial growth processes, including such factors as crystal growth and formation, vapor growth, twinning and thin film processes. The epitaxial growth process is currently being exploited for use in transistors and other devices. These 78 references are a supplement to a preceding available bibliography EPITAXIAL GROWTH, LMSD SRB 61-7, February 1961, also issued as AD-253 404, PB 156 958. The literature search covered sources from 1960 through February 1962. (Author)

AD-275 589 Div. 25, 20
(TISTE/CAM) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SPIN-ECHO RESONANCE.
Annual status rept. no. 4,
by D. E. Kaplan. 1 Apr 62, 28p. incl. illus.
tables, 12 refs. (Rept. no. 3-53-62-2)
(Contract Nonr-254100, Proj. NR 048-125)
Unclassified report

DESCRIPTORS: *Paramagnetic resonance, *Cavity resonators, *Relaxation time, *Data storage systems, Nuclear spins, Memory devices, Data transmission systems, Information theory, Radio receivers, Radio signals, Pulse modulation, Microwave equipment, Microwave networks, Electronic circuits, Paramagnetic crystals, X band, Magnetrons, Klystrons, Digital computers, Theory, Microwaves, Radiofrequency pulses.

A technical description of new high-resolution microwave X-band electron spin-echo instrumentation is presented and its application to paramagnetic relaxation time measurement and spin-echo information storage studies is discussed. Recent experimental results obtained in the course of these investigations are given. (Author)

AD-275 596 Div. 25
(TISTP/MFA) OTS price $6.60

Mellon Inst., Pittsburgh, Pa.
SOLID STATE STUDIES OF THE NOBLE (RARE) GASES
AND THEIR SOLID SOLUTIONS.
Final rept., 1 Mar 59-28 Feb 62,
by Harold P. Klug and D. Richard Sears.
30 Apr 62, 64p. incl. illus. tables.
(Contract AF 49(638)575)
(AFOSR 2570) Unclassified report

DESCRIPTORS: *Solidified gases, *Cryogenics, *Solubility, Solutions, *Rare gases, Superconductivity, *Cryostats, Nitrogen, Helium, X-ray spectrometers, Reliability, Thermal diffusion, Crystal structure, Lattices, Measurement, Temperature, X-ray diffraction analysis.

A spectrogoniometer cryostat has been designed and constructed for studying frozen gases by the x-ray counter diffractometer technique. The instrument is described in detail and its performance is reported. Solid xenon has been studied in the temperature range below 75 K. In particular, lattice parameters and volume expansion coefficients are reported for temperatures below 20 K, hitherto the lower limit of published crystallographic investigations of xenon. A value of 6.1317 ± 0.0005 Angstroms units is obtained for the lattice parameter of xenon extrapolated from 5.5 to 0 K. Incidental observations on krypton, gold, carbon dioxide, and carbon suboxide are reported. (Author)

AD-275 598 Div. 25
(TISTP/MFA) OTS price $2.75

Michigan U., Ann Arbor.
STUDY OF A SEEDED PLASMA.
Interim technical rept. on Solar and New Energy
Conversion Technique,
by Robert S. Bushman. Mar 62, 117p. incl.
illus. tables, 50 refs.
(Contract AF 33(616)8126, Proj. 7116)
(ARL 62-310) Unclassified report

DESCRIPTORS: *Plasma physics, *Electrical conductance, *Gas flow, Gas ionization, Energy, Magnetohydrodynamics, Transport properties, Chemical reactions, Additives, Alkali metals, Alkaline earth metals, Aluminum, Equations of state, Thermodynamics, Physical properties, Microwave equipment, Instrumentation, Chemical analysis.

A study was made concerning the method of increasing the electrical conductivity of a gas by introducing a foreign element into the gas flow. The important chemical reactions which take place when a fluid is seeded were analyzed as a function of temperature and pressure. The seeding elements considered (alkali metals, alkaline earths, and aluminum) were selected on the basis of their relatively low ionization potential. The fluids considered were air, oxygen, and nitrogen, although the results are applicable to any fluid. Major conclusions are: (1) The most favorable seeding element for thermal ionization of seeded air is that with the lowest ionization potential, although the stability of the MO gaseous molecules are of significance for the seeding elements considered, (2) If seeding is to be accomplished in a combustion region for diagnostic purposes, sodium or potassium should be used because of the relatively high stability of the MOH gaseous molecules of the other seeding elements, (3) The collision cross sections of the neutral sodium atom and the singly ionized sodium atom do not appear to be sufficiently large to influence the effective collision frequency of the plasma at the seeding rates tested. (Author)

AD-275 610 Div. 25, 30
(TISTP/TL) OTS price $12.50

Energy Conversion and Semiconductor Lab., Mass.
Inst. of Tech., Cambridge.
RESEARCH ON MATERIALS, PROCESSES, AND DEVICES

RELATED TO ENERGY CONVERSION.
Semiannual technical summary rept. no. 2.
30 Mar 62, 170p. incl. illus. tables, refs.
(Contract Nonr-184178, Proj. NR 099-360)
Unclassified report

DESCRIPTORS: *Energy, *Engineering, *Thermoelectricity, *Thermionic emission, Materials, *High temperature research, Metallurgy, Deformation, Fracture (Mechanics), *Superconductors, Microstructure, Mechanical properties, Solenoids, Magnets, Fuel cells, *Electrochemistry, *Thermal radiation.

Contents: HIGH TEMPERATURE MATERIALS RESEARCH ON THERMOELECTRIC AND THERMIONIC MATERIALS: (1) Phase Diagram Investigations, (2) Deformation and Fracture of Thermoelectric Materials, (3) Preparation and Evaluation of MoTh02 Thermionic Emitter Materials. THERMAL ELECTRIC ENERGY CONVERSION RESEARCH: (1) Thermal-Photo-Voltaic Energy Converter, (2) Development of a Radiation Source for the Thermal-Photo-Voltaic Energy Conversion System, (3) Graded-Gap Converter, (4) Investigation of the Lead-Telluride Tin-Telluride Solid Solution System. THERMIONIC ENERGY CONVERSION RESEARCH: (1) Thermionic Energy Conversion Research, (2) Experimental Program. SUPERCONDUCTING MATERIALS RESEARCH: (1) Development of a Ductile, High Field, High Current Ternary Superconducting Alloy, (2) Microstructure Superconductivity and Mechanical Properties of Sintered Nb-Sn Compacts. SUPERCONDUCTING SYSTEMS RESEARCH: (1) Large Volume Superconducting Solenoid. ELECTROCHEMICAL ENERGY CONVERSION RESEARCH: (1) Cathode Studies in Aqueous Systems. (2) Oxidation of Formic Acid. (Author)

AD-275 613 Div. 25, 30, 12
(TISTP/MFA) OTS price $3.60

National Bureau of Standards, Washington, D. C.
STANDARDIZATION OF THERMAL EMITTANCE MEASUREMENTS PART III. NORMAL SPECTRAL EMITTANCE, 800 DEGREES - 1400 K.
Interim rept. for 1 July 60-30 June 61 on Materials Analysis and Evaluation Techniques,
by William N. Harrison, Joseph C. Richmond and Harold K. Skramstad. Mar 62, 33p. incl. illus. table.
(Contract AF 33(616)61-02, Proj. 7360; Continuation of Contract AF 33(616)58-20)
(WADC TR 59-510, pt. 3)
Unclassified report

DESCRIPTORS: *Thermal radiation, *Standardization, Measurement, Calibration, Temperature, *Infrared spectroscopy, Blackbody radiation, Optical systems, Laboratory furnaces, Detectors, Phototubes, Electronic equipment, Computers, Data processing systems, Chromium alloys, Satellite vehicle research, Tests, Iron alloys, Nickel alloys, Platinum, Rhodium, Sheets.

The equipment for direct measurement of normal spectral emittance was extensively modified by incorporation of a new external optical system that increased the amount of radiant energy available for measurement by a factor of about 10, and other associated changes. The test procedure was modified by incorporation of a zero line correction. The equipment was calibrated by means of sector-disc attenuators which passed known fractions of the radiant flux from a blackbody furnace. An equation relating the normal spectral emissivity of a metal to five other parameters of the metal, each of which makes a non-linear contribution to the emissivity, was solved for one set of data by long hand methods. Some progress was made in setting up a program for solution of the equation by use of an electronic computer. Equipment for the automatic recording of spectral emittance data in a form suitable for direct entry into an electronic computer, and on-line computation from spectral emittance data of total emittance or solar absorptance, was designed. (Author)

AD-275 620 Div. 25
(TISTP/WH) OTS price $5.60

Providence Coll., R. I.
HIGH J - LOW K MULTIPLETS IN THE ROTATIONAL SPECTRUM OF SULFUR DIOXIDE.
Final rept.,
by Edwin K. Gora. Feb 62, 47p. incl. illus. tables, 13 refs.
(Contract AF 19(604)2216, Proj. 8603)
(AFCRL 62-445) Unclassified report

DESCRIPTORS: *Molecular spectroscopy, Molecules, Gases, Ozone, Dioxides, Sulfur compounds, *Microwaves, *Infrared radiation, Absorption, Electron transition, Rotation, Hyperfine structure.

Theoretical and computational methods are developed for the prediction of absorption contours due to molecular absorption in the microwave and far infrared region. Considerable time was also devoted to the evaluation of the rotational spectra of ozone and sulfur dioxide. (Author)

AD-275 626 Div. 25
(TISTM/BRW) OTS price $5.60

Rensselaer Polytechnic Inst., Troy, N. Y.
STRESS PROPAGATION IN NON-LINEAR VISCOELASTIC MATERIALS,
by Edward J. Mercado. 1 May 62, 40p. illus. 16 refs. (Technical rept. no. 3)
(Contract DA 30-115-509-ORD-1009)
Unclassified report

DESCRIPTORS: *Solids, Soils, *Stresses, Deformation, Plastic flow, Plasticity, Elasticity, Viscosity, Wave transmission, Shock waves, Theory, Mathematical analysis, Partial differential equations, Propagation.

A theory for the propagation of plane stress waves in strain-rate sensitive materials developed by Malvern (Quart. Appl. Math. 8, Jan 1951 and J. Appl. Mechanics 18:203, 1951) is modified to include finite amplitude strains. An approximate solution is derived for the infinitesimal strain theory for a constant stress boundary condition. A general development of dynamic stress-strain laws from basic assumptions is presented. General techniques are outlined for obtaining numerical solutions utilizing high speed digital computers. (Author)

AD-275 647 Div. 25
(TISTB/LH) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
DIELECTRIC HEATING: AN ANNOTATED BIBLIOGRAPHY, comp. by Helen M. Abbott. Feb 62, 18p. 57 refs.
(Special bibliography no. SB-61-55; Rept. no. 3-80-62-3)
Unclassified report

DESCRIPTORS: *Bibliography, *Heating, Heat production, *Dielectrics, *Induction heating, Dielectric films, Plastics, Ceramic materials, Physical properties, High frequency.

AD-275 706 Div. 25, 15
(TISTP/MFA) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
NON-UNIFORM MAGNETOHYDRODYNAMIC SHOCK PROPAGATION, WITH SPECIAL REFERENCE TO CYLINDRICAL AND SPHERICAL SHOCK WAVES,
by Roy M. Gundersen. Mar 62, 35p. incl. illus. tables, 17 refs. (MRC Technical summary rept. no. 310)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Shock waves, *Propagation, Ducts, Gas flow, Perturbation theory, Pressure, Velocity, Density, Entropy, Electrical conductance, Algebraic topology, Partial differential equations.

Previous work on non-uniform shock propagation in monatomic conducting gases is generalized to an arbitrary value of the adiabatic index. Specifically, the perturbation generated when an initially uniform hydromagnetic shock of arbitrary strength impinges on an area variation is determined, the problem being linearized on the basis of small area variations. When the shock encounters the area change, the shock strength is altered, and the subsequent flow is non-isentropic. There are two distinct contributions to the perturbation, namely, a permanent perturbation due to the area change and a transient reflected disturbance, and expressions for these are obtained. A first order relation between area change and shock strength is obtained and integrated numerically to give an area-shock strength relationship valid for channels with finite continuous area variation. Particular area distributions are utilized to discuss converging cylindrical and spherical hydromagnetic shocks. The present theory includes results on non-uniform gas dynamic shock propagation as a special case. (Author)

AD-275 729 Div. 25
(TISTP/WH) OTS price $5.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE PROPAGATION AND REFLECTION OF STRESS PULSES IN LINEAR VISCOELASTIC MEDIA,
by H. Kolsky and S. S. Lee. May 62, 53p. incl. illus. 13 refs. (Technical rept. no. 5)
(Contract Nonr-56230, Proj. NR-064-450)
Unclassified report

DESCRIPTORS: *Stresses, Deformation, Propagation, *Wave transmission, Solids, Elasticity, Viscosity, Digital computers.

A number of aspects of the propagation of stress pulses in real viscoelastic solids are discussed. A digital computer was used to carry out calculations on four specific types of problems: (1) the relation between the 'shapes' of a viscoelastic pulse with respect to particle velocity, strain and stress, (2) the determination of the response of a viscoelastic solid to sinusoidal stresses from observations of the change in the shape of a pulse as it travels along a rod of the material, (3) the reflection of a pulse at the boundary between two viscoelastic rods and in particular the unusual reflected pulse shapes that can occur when the viscoelastic properties of the two rods are such that the junction between the rods behaves as a 'fixed' boundary in one frequency range and as a 'free' boundary in another range of frequencies, and (4) the oblique reflection of plane distortional and dilatational pulses at the free boundary of a viscoelastic solid. (Author)

AD-275 733 Div. 25, 15
(TISTP/WH) OTS price $4.60

Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF THE MONOCAPILLARY THERMIONIC EMITTER AS A DUAL SOURCE OF IONS AND ELECTRONS.
Quarterly technical progress rept. no. 2, 15 Feb-15 May 62,
by D. L. Dresser and W. Laurita. 15 May 62, 42p. incl. illus. (Rept. no. EDR 2791)
(Contract AF 33(616)8299, Proj. 3145)
Unclassified report

DESCRIPTORS: *Thermionic emission, Ion sources, *Electrons, *Ions, *Cesium, Capillary tubes, Manufacturing methods, Cathodes.

Theoretical and experimental work is reported on the investigation of a capillary emitter serving as a dual source of ions and electrons in a thermionic converter. Improved agreement was achieved between the experimental data obtained on monocapillary test devices and a model based on the sheath potential concept. Several processes for fabricating multicapillary emitters are described, including stacking fine wires, spark machining, electrolytical etching, vapor deposition, and electrochemical deposition. Experimental results are given to show the feasibility of circulating cesium by means of an electromagnetic pump. Finally, the design and fabrication of a closed cycle (gravity feed) multicapillary thermionic converter are discussed. (Author)

AD-275 739 Div. 25, 9
(TISTP/WH) OTS price $1.60

AVCO Everett Research Lab., Mass.
A MAGNETIC ANNULAR ARC.
Rept. on Research on Plasma Propulsion,
by W. E. Powers and R. M. Patrick. Mar 61, 15p. incl. illus. 7 refs. (Rept. no. AMP 54)
(Contract AF 49(638)659, Proj. 9752)
(AFOSR-300) Unclassified report

DESCRIPTORS: *Thrust, Plasma physics, *Magnetohydrodynamics, Gases, Heating, Electric arcs, Magnetic fields, Hall effect, Transport properties, *Accelerators.

Experiments were carried out in a geometry where an arc was formed by a radial current in the annulus between two coaxial electrodes. The arc was used to heat a cold gas which was flowing in the axial direction in the annulus. There was an axial magnetic field throughout the flow region. The operation characteristics of this annular arc were calculated. The heat flux to the walls of the arc chamber was measured and compared to the theoretical value. The arc heated plasma is insulated from the walls because the density is high and collisions are sufficiently frequent so that energy can only diffuse to the walls from a very nearby region. The static and total pressures of the arc heat plasma were measured. (Author)

AD-275 761 Div. 25
(TISTP/MFA) OTS price $8.10

Radiation Lab., Johns Hopkins U., Baltimore, Md.
SPECTRAL CHARACTERISTICS OF RANDOM MODULATED WAVES,
by L. K. Lauderdale. May 62, 84p. incl. illus. 9 refs. (Technical rept. no. AF-94)
(Contract AF 33(616)6753)
Unclassified report

DESCRIPTORS: *Frequency modulation, *Radio waves, *Noise (Radio), Statistical processes, Statistical distributions, Band-pass filters, Probability, Time, Density, Functions, Fourier analysis, Taylor's series, Oscillographs, Communications theory, Analysis.

The spectral characteristics of random modulated waves are investigated with particular emphasis on the determination of power density spectra of sinusoids that are frequency modulated by band-pass Gaussian noise. Pertinent parts of the theory of random processes necessary for spectral analysis are reviewed, and a general formulation of the problem of determining spectral characteristics of random modulated waves is given. Limiting cases of large and small modulation indices are discussed, and a technique is developed for obtaining useful approximations of FM by band-pass noise spectra. These results are verified by digital computations and experimental measurements. Finally, spectra resulting from FM by the combination of band-pass noise and a sinusoid, and simultaneous AM by low-pass noise and FM by band-pass noise are investigated. (Author)

AD-275 762 Div. 25
(TISTP/MFA) OTS price $8.10

Radiation Lab., Johns Hopkins U., Baltimore, Md.
SURVEY OF DIAGNOSTIC TECHNIQUES USED TO DETERMINE TEMPERATURE AND DENSITY IN PLASMAS,
by L. D. Dickson. May 62, 82p. incl. illus. 41 refs. (Technical rept. no. AF-95)
(Contract AF 33(616)6753)
Unclassified report

DESCRIPTORS: *Plasma physics, *Temperature, *Density, Electrons, Ions, Gases, Oscilloscope probes, Microwaves, Scattering, Discharge tubes, Waveguides, Electromagnetic properties, Microwave spectroscopy, Bremsstrahlung, Photoemission, Optical equipment.

A summary is given of the three major plasma diagnostic techniques (probes, microwaves, and spectroscopy) presently used to determine electron, ion, and gas temperature, and electron and ion density. A review of the theory for each technique is given and the relative advantages and disadvantages of each technique are discussed. A comparative examination is made to determine the areas of greatest applicability of each technique. (Author)

AD-275 763 Div. 25
(TISTP/MFA) OTS price $12.00

Radiation Lab., Johns Hopkins U., Baltimore, Md.
THE INTERACTION OF PARAMAGNETIC IONS WITH LATTICE VIBRATIONS,
by A. Kiel. May 62, 166p. incl. illus. tables, 68 refs. (Technical rept. no. AF-93)
(Contract AF 33(616)6753)
Unclassified report

DESCRIPTORS: Paramagnetic crystals, *Paramagnetic resonance, *Crystal structure, Ions, *Ruby, *Rare earth compounds, Lanthanum compounds, Relaxation time, Lattices, Vibration, Fluorescence, Photons, Phonons, Operators (Mathematics), Tensor analysis.

The theory of the interaction of a paramagnetic ion with the lattice vibrations in an ionic crystal is investigated. A generalization of the Van Vleck approach to spin-lattice relaxation is developed which allows the determination of the effective vibrating crystal field in a semi-empirical manner. This technique is an improvement over some previous estimates of the vibrating potentials. The theory of relaxation effects in excited states of ionic crystals is presented in some detail. In addition to the conventional single phonon relaxation process, the theory of multi-phonon emission is developed as a tentative explanation of the quenching of fluorescence observed in many paramagnetic crystals. The simple (one phonon) relaxation theory is applied to the case of the 2E state of ruby. A variety of states in rare earth crystals are also investigated on the basis of the simple relaxation theory. Another mechanism for the temperature dependence of the line breadth is developed which is based on the adiabatic variation of the local fields due to lattice vibrations. The adiabatic and relaxation line broadening mechanisms are compared for the rare earths. (Author)

AD-275 768 Div. 25
(TISTP/WH) OTS price $1.60

Maryland U., College Park.
DEUTERON WIDTHS IN 1p-SHELL NUCLEI,
by M. A. Nagarajan. Mar 62, 13p. illus. 4 refs.
(Technical rept. no. 247)
(Sponsored by the Office of Naval Research)
Unclassified report

DESCRIPTORS: *Deuterons, *Nuclei, *Nuclear shell models, Atomic radii, Quantum mechanics.

An estimate of the deuteron widths in 1p-shell nuclei has been made using harmonic oscillator wave-functions for the single nucleon wave functions. The results show that large deuteron widths in light nuclei are not in contradiction to the predictions of the shell model. It is also shown that such large deuteron widths are a direct consequence of the large size of the deuteron. (Author)

AD-275 770 Div. 25
(TISTP/WH) OTS price $4.60

Massachusetts Inst. of Tech., Cambridge.
A STUDY OF THE DIFFERENTIAL EQUATIONS OF COUPLED VIBRATIONS AND FREE CONVECTION FROM A HEATED HORIZONTAL CYLINDER.
Final technical rept. on Research on Aerodynamic Fields,
by R. S. Dougall, T. Chiang, and R. M. Fand.
Dec 61, 36p. incl. illus. tables, 24 refs.
(Contract AF 33(616)6076, Proj. 7064)
(ARL-148, pt. 1) Unclassified report

DESCRIPTORS: *Vibration, *Heat transfer, *Convection, Acoustics, Thermodynamics, Cylindrical bodies, Differential equations, Harmonic analysis, Harmonic oscillators.

The basic equations and the boundary conditions which govern the problem of coupled transverse vibrations and free convection from a heated horizontal cylinder are presented. By applying a method developed by C. C. Lin, (Proc. 9th Inter. Congr. Appl. Mech., 139, 1959), it is shown: (1) that the presence of harmonic oscillations modify the steady-flow solution only when pressure gradients are present; (2) that the modifying forces have their most pronounced effect on the

fluid closest to the surface; and (3) that the product of a and the circular frequency of rotation (af) is a measure of the magnitude of the modifying forces. The use of the quantity (af) as a measure of the magnitude of the influence of vibrations on free convection agrees with experimental correlations. By transforming the differential equations into dimensionless form, it is shown that four dimensionless parameters are needed to fully describe the flow. A perturbation method is applied to one set of equations, and the zeroth-order solution is obtained. This zeroth-order solution, which corresponds to free convection, agrees with Hermann's analysis for a heated horizontal cylinder. (Author)

AD-275 771 Div. 25
(TISTP/WH) OTS price $3.60

Massachusetts Inst. of Tech., Cambridge.
A COMPARISON OF THE INFLUENCE OF MECHANICAL AND ACOUSTICAL VIBRATIONS ON FREE CONVECTION FROM A HORIZONTAL CYLINDER.
Rept. on Research on Aerodynamic Fields,
by R. M. Fand and E. M. Peebles. Dec 61, 25p. incl. illus. 9 refs.
(Contract AF 33(616)6076, Proj. 7064)
(ARL-148, pt. 2) Unclassified report

DESCRIPTORS: *Vibration, *Heat transfer, *Convection, Acoustics, Thermodynamics, Cylindrical bodies.

The results are presented of an experimental investigation of the influence of horizontal transverse mechanical vibrations (frequency order of magnitude: 100 cps) upon the rate of convective heat transfer from a horizontal cylinder. The results are compared with earlier findings. It is shown that, in spite of a tenfold difference in frequency (and amplitude), the heat-transfer correlation equation previously developed for horizontal acoustical vibrations is also valid for horizontal mechanical vibrations, and that the character of the boundary-layer flow is the same (thermoacoustic streaming) for these two cases. (Author)

AD-275 772 Div. 25
(TISTP/WH) OTS price $3.60

Massachusetts Inst. of Tech., Cambridge.
THE LOCAL HEAT TRANSFER COEFFICIENT AROUND A HEATED HORIZONTAL CYLINDER IN AN INTENSE SOUND FIELD.
Final technical rept. on Research on Aerodynamic Fields,
by R. M. Fand, J. Roos and others. Dec 61, 25p. incl. illus. tables.
(Contract AF 33(616)6076, Proj. 7064)
(ARL-148, pt. 3) Unclassified report

DESCRIPTORS: *Vibration, *Heat transfer, *Convection, Acoustics, Thermodynamics, Cylindrical bodies.

The local heat-transfer coefficient around the circumference of a heated horizontal cylinder, both in the presence and absence of a strong stationary sound field, was studied. Superposition of intense sound upon the free-convection temperature-velocity field about a heated horizontal cylinder increases the heat-transfer coefficient both on the under and upper portions of the cylinder's surface. In the presence of a sound field for which SPL = 146 db (re 0.0002 microbar) and f = 1500 cps, the maximum measured increases in the local heat-transfer coefficient on the under and upper portions of a 3/4-inch diameter cylinder--relative to the free convection case at the same temperature potential--were approximately 250 and 1200 per cent, respectively. A comparison of these results with earlier flow-visualization studies indicates that the relatively large percentage increase in the heat-transfer coefficient on the upper portion of the cylinder is caused by the oscillating vortex flow which is characteristic of thermoacoustic streaming. (Author)

AD-275 773 Div. 25
(TISTP/WH) OTS price $3.60

Massachusetts Inst. of Tech., Cambridge.
ON THE MECHANISM OF INTERACTION BETWEEN VIBRATIONS AND HEAT TRANSFER.
Final technical rept. on Research on Aerodynamic Fields,
by R. M. Fand. Dec 61, 28p. incl. illus. 18 refs.
(Contract AF 33(616)6076, Proj. 7064)
(ARL-148, pt. 4) Unclassified report

DESCRIPTORS: *Vibration, *Heat transfer, *Convection, Acoustics, Thermodynamics, Cylindrical bodies.

Several hypotheses have been proposed in the literature to explain the physical mechanism whereby transverse vibrations increase the rate of heat transfer by free convection from horizontal cylinders. A discussion is presented of the validity of these hypotheses in the light of recent experimental data. The increase in the heat-transfer rate from a heated horizontal cylinder subjected to transverse horizontal vibrations is caused by thermoacoustic streaming. The increase is greatest on the upper half of the cylinder due to the action of the oscillating vortex flow which develops in this region at high intensities of vibration. The heat-transfer rate also increases on the lower half of the cylinder, where the flow is laminar. In the laminar region the rise in the rate of heat transfer appears to be caused by oscillations within the boundary layer similar to the effect of free-stream turbulence on the rate of heat transfer from a cylinder in cross-flow. The critical intensity of vibrations is approximately 0.3 ft/sec for vertical as well as for horizontal transverse vibrations of a heated horizontal cylinder. (Author)

AD-275 778 Div. 25, 15
(TISTP/MFA) OTS price $6.60

Institute of Field Physics, U. of North Carolina, Chapel Hill.
QUANTIZATION OF FIELDS WITH INFINITE-DIMENSIONAL INVARIANCE GROUPS. III. GENERALIZED SCHWINGER-FEYNMAN THEORY,
by Bryce S. DeWitt. May 62, 61p. incl. illus.
(Publication no. 13)
(Contract Nonr-855(07); Grant no. AFOSR 61-72)
(AFOSR-2572) Unclassified report

DESCRIPTORS: *Quantum mechanics, *Topology, *Groups (Mathematics), Gravity, Theory, Tensor analysis, Transformations (Mathematics), Integral transforms, Green's function, Fourier analysis, Quantum statistics, Partial differential equations.

Nonlinear field theories having elementary vertex functions of arbitrarily high order are presented.

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Emphasis is given to purely formal aspects of the theory which may be expected to survive generalization to situations in which standard asymptotic conditions are inapplicable. Since the context in which the field nonlinearities are assumed to appear is that of a non-Abelian infinite dimensional invariance group, detailed attention is given to the question of a group invariant measure for the Feynman functional integral. It is shown that the physically important part of the measure is not determined by the group. The theory of the propagators and correlation functions are also given which characterize the system when invariant variables are introduced. The existence of a c-number action functional which contains a complete description of all quantum processes is proved. The second variational derivatives of this functional constitute the wave operator for the one-particle propagators (including all radiative corrections) and its higher derivatives are the renormalized vertex functions. Finally, the implications for application to quantum gravidynamics are discussed. Because it leads to nonlocal covariant equations for a complex metric tensor the way is open to transmutations of topology at the quantum level. (Author)

AD-275 779 Div. 25
(TISTM/BRW) OTS price $6.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SNAPPING PHENOMENA OF ELASTO-PLASTIC CURVED BEAMS UNDER STATIC AND DYNAMIC LOADINGS,
by P. T. Hsu and M. M. Chen. Jan 62, 55p. incl. illus. 3 refs. (Rept. no. TR 100-2)
(Contract AF 49(638)985, Proj. 9782)
(AFOSR-2460) Unclassified report

DESCRIPTORS: *Beams, *Buckling, Loading, Dynamics, Statics, Elasticity, Plasticity, Stresses, Deflection, Deformation, Motion, Stability, Mathematical analysis, Structures, Airframes, Velocity, Load distribution, Moments.

The snap-buckling problems for an elasto-plastic curved beam under laterally applied static and dynamic loads are investigated. By neglecting the transverse shear and strain-rate effects, the governing equations for various phases of motion are formulated for a simplified model. Elasto-perfectly-plastic materials are considered. Numerical results of the analytic solutions are given in the form of load-deflection relations and phase trajectories for several typical cases. (Author)

AD-275 786 Div. 25, 26
(TISTM/EJH) OTS price $7.60

David Sarnoff Research Center, Princeton, N. J.
EPITAXIAL GROWTH OF SILICON.
Scientific rept. no. 4 on Investigations of Fundamental Limitations Determining the Ultimate Size of Microstructures,
by A. Revesz. 1 Dec 61, 54p. illus. 50 refs.
(Contract AF 19(604)8040, Proj. 5633)
(AFCRL-1120) Unclassified report

DESCRIPTORS: *Semiconductors, *Semiconducting films, *Thin films, *Single crystals, *Silicon, Growth, Manufacturing methods, Impurities, High temperature research, Vapor plating, Metallic smoke deposits, Vapors, Transport properties, Reduction, Silicon compounds, Chlorides.

Epitaxial growth of silicon on a silicon substrate by hydrogen reduction of $SiCl_4$ was investigated. The chemical and physical processes involved in both the growing and the preceding heat treatment processes were studied and correlated to the experimental results. Epitaxially grown single crystal silicon layers were produced at temperatures between 1100 and 1300 C. The effects of the concentration of $SiCl_4$ in H_2, the flow rate of the gas, the temperature and the surface condition of the substrate on the overall performance of the process were investigated. (Author)

AD-275 795 Div. 25, 15
(TISTP/MFA) OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
DIFFRACTION BY A REFRACTING WEDGE,
by Michael Papadopoulos. Mar 62, 45p. incl. illus. 6 refs. (MRC technical summary rept. no. 297)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Acoustics, *Elastic scattering, *Diffraction, Refraction, Complex variables, Wedges, Wave analysis, Dielectrics, Potential theory, Perturbation theory, Transformations (Mathematics), Electromagnetic waves, Velocity, Mathematical analysis.

The refraction and scattering of acoustic plane waves following their arrival at the tip of a refracting wedge are examined. The scattered field contains not only plane waves reflected from the plane walls of the prisms but also the field diffracted at the sharp edge. It is not necessary to discuss the dominant refraction effects in any detail because they are so well-known. The diffraction properties however, are quite unknown. To understand these properties it is necessary to consider the mathematical difficulty of defining a normal derivative on the inside of an acute-angled wedge close to the vertex. It may be that the uniform use of the interaction conditions across the refracting surfaces at all distances from the vertex leads to no solution, and that the only well-set problem of this type may be one where the wedge has a rounded tip (as when the wedge is of hyperbolic section) with large curvature.

AD-275 799 Div. 25, 7
(TISTM/EJH) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
GAMMA INDUCED PHOTOCONDUCTIVITY IN A POLYETHYLENE TEREPHTHALATE CAPACITOR,
by Edward E. Conrad and Stuart M. Marcus.
4 May 62, 23p. incl. illus. table, 4 refs.
(DOFL rept. no. TR-1037)
(Proj. 23300)
Unclassified report

DESCRIPTORS: *Capacitors, *Dielectrics, *Photoconductivity, Radiation effects, Gamma rays, Theory, Test methods, Test equipment, Plastics, Polymers, Ethylenes, Phthalates.

Gamma-induced photoconductivity was measured in a Mylar (polyethylene terephthalate) capacitor over a range of flux from 100 R/sec to 4,000,000 R/sec. The results generally agree with data of other researchers and with the semiempirical relationship: S = Kg to the l power; where S = photoconductivity, 1/(ohm-cm); g = gamma flux, R/sec; K = a constant of proportionality characteristic of the material; l = an exponent, also characteristic of the material. A least squares fit of this curve to the data yields values of K = (6.2 ± 0.6) x 10 to the -19th power 1/(ohm-cm) and l = 1.11 ± 0.01. (Author)
R/sec

AD-275 809 Div. 25, 17
(TISTM/EJH) OTS price $3.60

Hammond Metallurgical Lab., Yale U., New Haven, Conn.
X-RAY DIFFRACTION STUDY OF THE EFFECTS OF SOLUTES ON THE OCCURRENCE OF STACKING FAULTS IN SILVER-BASE ALLOYS,
by R. P. I. Adler and C. N. J. Wagner. May 62, 26p. illus. 37 refs. (Technical rept. no. 3)
(Contract Nonr-60943)
Unclassified report

DESCRIPTORS: *Silver alloys, Cadmium alloys, Indium alloys, Tin alloys, Crystal structure, *Lattices, *Deformation, Solid state physics, Mathematical analysis, Theory, *X-ray diffraction analysis.

Alloying Cd, In, and Sn with Ag increases the density of stacking faults in these cold worked alloy filings with respect to pure Ag. Corresponding to the increase in stacking fault frequency as a function of alloying, there is a significant decrease in the effective particle sizes and the domain size in the plane of the stacking fault. Using the relative changes in lattice parameter calculated from the individual reflections, both deformation fault probability and lattice parameter of a deformed material can be determined. After cold working there was a detectable decrease in lattice parameter of the Sn but not the In alloys. Values of the faulting density obtained from asymmetry and peak maxima measurements were consistent with the ones obtained from anisotropic particle size measurements. (Author)

AD-275 816 Div. 25
(TISTP/MFA) OTS price $1.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
ON AN ANALYTICAL REPRESENTATION OF THE THERMODYNAMIC FUNCTIONS OF DISSOCIATING AIR. (Ob Analiticheskom Predstavlenii Termodinamicheskikh Funktsii Dissotsiiruyushchevo Vozdukha),
by V. V. Mikhailov, tr. by John W. Brook.
May 62, 12p. incl. illus. 2 refs. (Trans. rept. no. TR-21 from Inzhenerno Sbornik, Vol. 28, 1960)
Unclassified report

DESCRIPTORS: *Thermodynamics, *Dissociation, *Air, Analysis, Chemical reactions, Excitation, Temperature, Energy, Functions, Gases, Partial differential equations, Molecules, Enthalpy, Entropy, Specific heat, Gas ionization, Gas flow.

On the basis of an approximately given statistical sum of gas molecules, an analytical expression for the thermodynamic properties of dissociating air is obtained. At temperatures of the order of 200 C and higher, a noticeable excitation of the vibrational degrees of freedom of the air molecules sets in, and at temperatures of the order of 2000 decomposition of the molecules into atoms-dissociation-sets in. At the same time the processes of excitation of new vibrational and electronic levels, and also the process of excitation of those rotational levels which depend upon the stiffness of the connection of atoms to molecules, continues. To take into account all of these phenomena, the expressions for the thermodynamic functions of dissociating air become very cumbersome. This practically excludes the possibility of their direct application for flow calculations. However, it is possible to obtain comparatively simple and accurate representations for the thermodynamic functions of dissociating air if we neglect the processes of excitation of the extra degrees of freedom of the molecules. (Author)

AD-275 817 Div. 25, 18, 24
(TISTP/WH) OTS price $8.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
STUDY OF SPATIAL FILTERING BY OPTICAL DIFFRACTION FOR PATTERN RECOGNITION.
Final rept.,
by Paul G. Roetling. 13 Feb 62, 86p. incl. illus.
(Rept. no. VE-1522-G-1)
(Contract AF 30(602)2427, Proj. 6244)
(RADC TR 62-93) Unclassified report

DESCRIPTORS: Aerial reconnaissance, *Aerial photography, *Optical filters, Optics, Diffraction, *Target recognition, Fourier analysis, Integral transforms.

The theory of spatial filtering is reviewed and the parameters significant in the design of an experimental filtering apparatus are discussed. A working experimental apparatus capable of analyzing photographic transparencies is shown. Results of its use in the enhancement of simple geometric patterns are compared to theoretical predictions. Several examples of the filtering of aerial photographic transparencies containing targets of military significance are considered; and the degree of enhancement obtained is discussed. It is concluded that spatial filtering can enhance imagery, and successfully provide discrimination of several target classes. Recommendations include studies of target class characteristics, and optimum filter design and fabrication. (Author)

AD-275 819 Div. 25
(TISTW/RD) OTS price $8.10

Motorola, Inc., Riverside, Calif.
NUCLEAR MAGNETIC RESONANCE RATE GYRO PERFORMANCE.
Rept. on Fundamental Sensor Study,
by E. E. Dodd. Apr 62, 83p. 22 refs.
(Technical rept. no. RL-TR-3846-4)
(Subcontract to Bell Helicopter Corp., Fort Worth, Tex., Contract Nonr-167000)
Unclassified report

DESCRIPTORS: *Gyroscopes, *Nuclear magnetic resonance, Nuclear spins, Paramagnetic resonance, Dipole moments, Magnetic fields, Nuclear magnetic dipole moments, Drift, Magnetic moments.

The effect of inertial rotation in nuclear magnetic resonance is described, and several schemes for rate gyro operation are given. A generalized expression is obtained for the directional drift of a rate or an integrating rate nuclear magnetic

resonance (nmr) gyro due to resonance sensing error. An unavoidable source of such error is the inherent magnetic noise in a nuclear spin system, and the resulting gyro directional drift for a steady state Bloch spin system is expressed in terms of adjustable parameters (temperature, field strengths, relaxation times, etc.). For conventional laboratory parameter values, the rms one-hour drift due to spin system magnetic noise is about one degree. A cursory discussion of a rapid adiabatic passage gyro is included. (Author)

AD-275 843 Div. 25, 30, 15
(TISTP/MFA) OTS price $1.60

Cambridge Language Research Unit (Gt. Brit.).
A THEORY OF THE ORIGIN OF MASS WITHIN A CONTROL MODEL OF THE ELEMENTARY PARTICLES.
Technical note on Research on Information Structures,
by E. W. Bastin and A. Woodside. 20 Feb 62, 11p. incl. illus. 4 refs.
(Contract AF 61(052)331)
(AFOSR-2702) Unclassified report

DESCRIPTORS: *Particles, *Theory, *Mass number, *Computer logic, Matrix algebra, Measurement, Calibration, Analog systems, Operators (Mathematics), Quantum mechanics, Electrical networks.

A new method is shown for calculating elementary particle constants because the current method is appropriate only when some constants, which will be called primary constants, are assumed to be known already. The experimental computing method for deriving numbers which have the right logical form to be interpreted as the primary type of constant characteristic of elementary particles is described. A summary of the theoretical status of the results obtained is presented. (Author)

AD-275 847 Div. 25
(TISTM/EJH) OTS price $2.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
SINGLE CRYSTAL SILICON OVERGROWTHS,
by Albert Mark. Jan 62, 22p. incl. illus. 5 refs. (ASRDL technical rept. no. 2254)
Unclassified report

DESCRIPTORS: *Single crystals, *Silicon, Deposits, Growth, *Vapor plating, Vapors, Silicon compounds, Chlorides, Temperature control.

The pyrolytic process for the vapor phase deposition of single crystal silicon overgrowths on parent substrates is described. This method utilizes the dissociation of $SiCl_4$ by H in an open tube flow process. Free energy and vapor pressure data are plotted for $SiCl_4$, BCl_3, and PCl_3, showing the dissociation relationship between these reacting species for junction formation. Photographs indicate the dependence on temperature of the Si morphologies that deposit on the substrates, other variables being held constant. Because of the low thermal conductivity of silicon, emphasis is placed on direct contact heating of the silicon substrates to control overgrowth quality. (Author)

AD-275 881 Div. 25
(TISTP/MFA) OTS price $6.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
STUDY OF INFRARED EMISSION IN HEATED AIR.
Annual rept., July 59-May 60,
by Walter H. Wurster and Paul V. Marrone.
June 60, 51p. illus. 20 refs. (Rept. no. QM-1373-A-2)
(Subcontract to Bendix Systems Div., Ann Arbor, Mich., Contract DA 11-022-ORD-3130)
Unclassified report

DESCRIPTORS: *Infrared spectroscopy, *Infrared radiation, *Shock waves, *Re-entry vehicles, *Gases, Air, Chemical reactions, Reaction kinetics, Relaxation time, Thermodynamics, Vibration, Dissociation, Transport properties, Computers, Programming, Instrumentation, Tests, Shock tubes, Design.

A study of the infrared emission in heated air is summarized. The experimental apparatus for quantitative measurement of the radiated infrared energy is described. The design, calibration and testing of the shock tube and a multichannel infrared spectrometer are presented. Preliminary measurements of the radiation from nitrogen in the wavelength range from 0.95 to 1.10 microns are reported. These results clearly show the strong (0,0) and (2,2) bandheads of the nitrogen 1st positive system. Measurements of the dependence of the radiation intensity on temperature over the range studied (5700 - 7000 K) are in good agreement with predictions for this band system based on the equilibrium populations of the upper energy levels from which the transitions occur. A general analysis of the non-equilibrium flow around re-entry vehicles is presented which considers finite-rate kinetics and includes the coupling of vibration and dissociation in the gas. The numerical techniques to be employed in the solution of the equations are discussed. (Author)

AD-275 883 Div. 25
(TISTP/WH) OTS price $2.60

Keck, W. M., Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
CHARACTERISTIC MODIFIED X-RAY SCATTERING,
by K. Das Gupta. May 62, 25p. incl. illus. tables, 5 refs. (Technical rept. no. 5)
(Contract Nonr-22030)
Unclassified report

DESCRIPTORS: *X rays, *Scattering, X-ray spectroscopy, Lithium, Lithium compounds, Fluorides, Oxides, Beryllium, Boron, *Electron transitions.

The spectroscopic analysis of the scattered x-rays from lithium, lithium oxide, lithium fluoride, beryllium and boron irradiated by copper target radiation establishes the existence of sharp characteristic modified lines on the longer wavelength side of the primary beam. This is a new type of incoherent x-ray scattering. The K term values of lithium, beryllium and boron and the L_1 term value of fluorine in lithium fluoride have been calculated from the observed modified lines and these are 58.1, 113.6, 199.0 and 40.6 electron volts respectively. Taking into account the limits of error in these experiments the term values obtained by this new method agree well with the values obtained by Skinner by the method of soft x-ray spectroscopy. Evidence obtained until now about the angular dependence of intensity of the newly observed modified lines brings up several interesting points helping to understand the particular process of scattering and these points have been discussed. (Author)

26. PRODUCTION AND MANAGEMENT

AD-275 399 Div. 26, 17
(TISTM/JSM) OTS price $4.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
TUNGSTEN SHEET ROLLING PROGRAM.
Interim technical progress rept. no. 4 on Phase 3,
by W. J. Schoenfeld. May 62, 36p. incl. illus. tables.
(Contract AF 33(600)41917)
(ASC TR 7-827, vol. 4) Unclassified report

DESCRIPTORS: *Tungsten, Sheets, *Rolling mills, Processing, Metals, Forging, Extrusion, Heat treatment, Temperature, Transition temperature, Tensile properties, Microstructure, Hardness, Mechanical properties.

The completed evaluations from the preliminary rolling investigations are reported. Data is established showing the effects of rolling temperature, reductions, and annealing treatments on the microstructure, tensile properties, and bend transition temperature. The effects of InFab fabrication versus conventional processing are discussed. These investigations have resulted in the following conclusions: (1) Extruded sheet bar shows slightly improved bend transition properties. (2) Reductions of approximately 92% result in the lowest bend transition temperatures. The lowest transition recorded was 200 F. (3) The initial rolling temperature should be no higher than 2300 F and the final rolling temperature should be 1900 F or lower. (4) Bend transition data on InFab rolled material shows no improvement over material rolled in air. (5) No improvement in transverse bend transition temperature was noted for InFab cross rolled material. This is not presently understood and will be evaluated further. (Author)

AD-275 378 Div. 26, 1
(TISTM/BRW) OTS price $1.25

National Bureau of Standards, Washington, D. C.
SOME PROBLEMS OF FATIGUE OF BOLTS AND BOLTED JOINTS IN AIRCRAFT APPLICATIONS,
by Leonard Mordfin. Jan 62, 49p. incl. illus. 82 refs. (NBS Technical note no. 136)
(BUWEPS Proj. TED NBS RAAD-23-001)
(BUWEPS rept. no. RAAE-343-62-1)
Unclassified report

DESCRIPTORS: *Bolts, Nuts (Mechanics), *Bolted joints, Screw threads, Fatigue (Mechanics), Aircraft, Design, Specifications, Metal screws, Joints, Metal joints, Temperature, Metal coatings, Alloys.

The profuse variety of aircraft bolts which is available makes the evaluation and specification of bolts for engine and structural use extremely complex, particularly insofar as fatigue and hot fatigue environments are concerned. The state of knowledge of fatigue of bolts and bolted joints is surveyed and critically appraised in terms of aeronautical practices. Using this material as a basis, recommendations are made regarding the evaluation and specification of aircraft bolts for fatigue situations and regarding the growing problem of errors in fastener replacement. (Author)

AD-275 445 Div. 26, 17
(TISTM/BRW) OTS price $8.10

General Dynamics/Fort Worth, Tex.
EFFECTS OF ANDROFORMING ON MATERIAL PROPERTIES.
Interim technical engineering rept. no. 3, 1 Nov 61-28 Feb 62,
by C. D. Lantz, C. B. Crandall and others.
Mar 62, 73p. incl. illus. tables.
(Contract AF 33(600)42847)
(ASD TR 7-910, vol. 3) Unclassified report

DESCRIPTORS: *Metal forming presses, *Machines, *Sheets, Metal plates, Manufacturing methods, Aluminum alloys, Steel, Stainless steel, Titanium alloys, Operation, Control systems, Nomographs, Mechanical properties, Tensile properties, Deformation, Processing.

The forming parameters of .190, .250 and .375-in. thick materials were determined and incorporated into nomographs. The results of mechanical property tests showed a general increase in tensile and compressive yield strengths and a loss of per cent elongation for all materials tested. Cam control data for fabrication of variable contour parts was derived and test parts were fabricated to determine the reliability of the machine and set up data for production use. Some of these parts were roll formed after Androforming without significant effect on the material properties or the transverse contour of the part. The use of nomographs eliminated approximately 75% of the time formerly consumed with trial and error development of the machine set-up. It was found that cold-rolled, low carbon steel could be stiffened considerably while Androforming it to very shallow contours. Tensile strength was increased from 34 to 50 KSI with a reduction of elongation from 38 to 30%. (Author)

AD-275 487 Div. 26, 17
(TISTM/BRW) OTS price $2.00

Massachusetts Inst. of Tech., Cambridge.
RESEARCH ON WELD CRACKING BY HINDERED CONTRACTION,
by R. E. Travis, J. M. Barry and others. Sep 61, 23p. illus. 3 refs.
(Contract DA 19-020-505-ORD-4918, Proj. 5B93-32-004)
(WAL TR648.4/3) Unclassified report

DESCRIPTORS: *Welded joints *Stresses, *Fracture (Mechanics), Armor plate, Metal plates, Steel, Iron alloys, Manganese alloys, Molybdenum alloys, Arc welds, Welding rods, Cooling, Thermal stresses, Thermal expansion, Welds, Heat transfer, Deformation, Loading, Test equipment, Test methods.

In hindered contraction of restrained test welds, the development of self-imposed loads was found to depend systematically on the geometry and stiffness of restraint, the strength and hardenability of the filler and plate, the choice of process, and weld thermal variables. In the presence of a transverse bending moment, the factors which favor high restraint stresses also promote cracking, but without the bending moment cracking will not occur. Significant mechanical effects, such as increase of load or initiation of cracking, often take place long after the weld has cooled to room temperature. (Author)

Division 26 - PRODUCTION AND MANAGEMENT

AD-275 489 Div. 26, 17, 14
(TISTM/BRW) OTS price $9.10

Metcut Research Associates, Inc., Cincinnati, Ohio.
MACHINING OF REFRACTORY MATERIALS.
Technical engineering rept. on Phase 2, 1 Feb-30 Apr 62,
by L. J. Nowikowski, N. Zlatin, and M. Field.
May 62, 90p. incl. illus.
(Contract AF 33(600)42349)
(ASD TR 7-532a, vol. 6) Unclassified report

DESCRIPTORS: *Machining, *Heat resistant alloys, *Refractory materials, Tungsten, Tungsten alloys, Niobium alloys, Molybdenum alloys, Tantalum alloys, Titanium alloys, Zirconium alloys, Tool steel, Test methods, Tests, Data, Effectiveness, Cutting fluids, Alloys, Metals, Ceramic materials, Glass, Cutting tools, Carbide tools, Machine tools, Lathes, Milling machines, Drilling machines, Grinders, Grinding wheels, Taps, Drills, Reamers.

Machining studies were performed on pressed and sintered unalloyed W, D-31 Nb alloy, 90Ta-10W alloy, Mo TZM and Mo-0.5% Ti alloys and a high temperature glass ceramic material. The investigation consisted of drilling and grinding tests on W; turning, face milling and grinding on D-31 Nb; turning, drilling, reaming and tapping on 90Ta-10W alloy; face milling, end milling, drilling, reaming, tapping and grinding on Mo alloys; and grinding of the high temperature glass ceramic. (Author)

AD-275 491 Div. 26
(TISTP/TL) OTS price $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
QUALITY CONTROL FOR EXPENSIVE ITEMS,
by G. Elfving. 28 Feb 62, 29p. (Technical rept. no. 57)
(Contract Nonr-22553, Proj. NR 042-002)
Unclassified report

DESCRIPTORS: *Quality control, Sampling, *Industrial production, *Costs, Manufacturing methods, *Mathematical prediction, Statistical processes, Probability, Transformations (Mathematics), Matrix algebra, Geometry, Series, Complex variables, Integral equations, Linear systems.

This analysis is concerned with the continuous control of a manufacturing process of expensive items which are produced singly and, in general, turned out without inspection. Their quality varies randomly, with a strong correlation, however, between adjacent items. An inferior item is assumed to inflict a certain loss, depending on the degree of inferiority. To keep the production process from deteriorating, periodically an item is sampled and inspected to check the manufacturing process. After each inspection, one of the following actions is taken: (1) continue production, and take another sample after a certain time, depending on the quality observed; (2) stop and revise the manufacturing process. The objective of the theory is to find a rule for the decision to be made after each inspection. This rule has to balance the advantage of revising the process against the costs of inspecting, and perhaps stopping it. (Author)

AD-275 518 Div. 26, 12, 18
(TISTW/DLW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
INFORMATION SYSTEM DESIGN IN A COMPLEX ORGANIZATION: RAND'S LP-II MANNED SIMULATION,
by Robert W. Johnson. May 62, 30p. incl. table, refs. (Memo. no. RM-2901-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Guided missiles, *Logistics, *Maintenance, *Air force logistics, *Air force operations, *Management engineering, *Combat information centers, Surface to surface, Ground support equipment, Simulation, Military requirements, Military organizations, Command systems, Control systems.

The development of an information system created for a large-scale manned simulation of ICBM tactical support is described. The simulation, known as Laboratory Problem II (LP-II), was conducted in 1958-59. The purpose of LP-II was to develop improved base logistics for a mature wing of intercontinental ballistic missiles. To do so, it was necessary to develop a novel base maintenance and operations information system. The steps leading to the particular system adopted in this experiment are described. The study should be of interest to Air Force personnel responsible for the planning and design of large-scale information systems in such areas as base maintenance management and command and control. (Author)

AD-275 544 Div. 26, 17
(TISTM/BRW) OTS price $9.60

Alloyd Corp., Cambridge, Mass.
DEVELOPMENT OF NON-VACUUM ELECTRON BEAM WELDING.
Interim technical engineering rept., 15 Oct 61-15 Feb 62,
by L. H. Leonard, J. R. Morley, and L. Dunn.
Feb 62, 111p. incl. illus. tables, 20 refs.
(Contract AF 33(657)7237)
(AFSC TR 7-926, vol. 1)
Unclassified report

DESCRIPTORS: *Welding, *Electron beams, Metals, Controlled atmospheres, Argon, Helium, Nitrogen, Refractory materials, Heat resistant alloys, Alloys, Beryllium, Titanium, Titanium alloys, Steel, Stainless steel, Tool steel, Tungsten, Airframes, Feasibility studies.

Electron beam welding of aero-space metal in a non-vacuum environment is feasible if the electron beam has sufficient initial power density that, after being degraded by scattering, the residual power density is adequate to accomplish joining. This report suggests criteria and establishes system parameters to accomplish such welding. The minimum power-density required for the joining is approximately 0.5 mw/sq cm. Higher power densities, several megawatts per square centimeter, are necessary if deep narrow welds are to be obtained. To obtain these power densities in the non-vacuum environment, the beam, brought out from a region of high vacuum through a series of three differentially pumped apertures, must have an initial power density slightly in excess of 0.5 mw/sq cm when using He as the controlled environment. For the other gases considered, N and Ar, the requisite initial power density is 2 to 7 times higher. (Author)

AD-275 742 Div. 26, 17
(TISTM/EJH) OTS price $1.50

Wah Chang Corp., Albany, Oreg.
FABRICATION OF WIDE TUNGSTEN SHEET BY POINT DEFORMATION TECHNIQUES.
Interim rept. no. 3, 1 Feb-30 Apr 62,
by Edward S. Guidoboni. 30 Apr 62, 51p. incl. illus. tables, 7 refs.
(Contract NOw 61-1046-c)
Unclassified report

DESCRIPTORS: *Tungsten, *Sheets, Manufacturing methods, Deformation, Welds, Molybdenum wire, Tungsten wire, Welded joints, Powder metals, Sintering, Forging, Casting, Rolling mills, Conical bodies, Cylindrical bodies.

Conical flow turn experiments were conducted with W blanks in a variety of starting conditions. Pressed and sintered, sintered and forged, sintered and rolled, and arc cast and rolled materials were all successfully flowed 25% into 90 degree cones. The lowest working temperature was 600 F for the arc cast and rolled W, while the highest was 1400 F for the as-sintered blanks. The feasibility of the form and weld approach to cylindrical blank preparation was demonstrated. Welded blanks, employing both Mo and W fillers in the joints, were successfully flow turned from 1/8-inch thick to as low as 0.013-inch thick. Some weld failure was evidenced but was eliminated by raising the blank temperature and decreasing the reduction on the first pass. Surface scaling occurred in the heat affected zone of the tungsten welded cylinders. Experimental flattening of a cylinder to produce sheet is described. Tensile specimens, taken from the flow turned sheet displayed good strength and ductility in both directions. Bend tests revealed a ductile-brittle transition occurring between 500 and 550 F. (Author)

AD-275 828 Div. 26, 30
(TISTP/MFA) OTS price $8.60

System Development Corp., Santa Monica, Calif.
SIMPAC USERS' MANUAL.
Technical memo.,
by R. P. Bennett, P. R. Cooley and others.
15 Apr 62, 95p. incl. illus. tables (Technical memo. no. TM-602/000/00)
Unclassified report

DESCRIPTORS: *Digital computers, *Simulation, *Control systems, *Management engineering, Operations research, Analog systems, Information retrieval, Documentation, Programming, Sequential analysis, Design, Coding, Time, Scheduling, Vocabulary, Computer logic.

SIMPAC is a research tool for simulation. It offers the analyst and designer of systems a means of modeling a complex system and allows him to study the dynamics of a system without concern of the mechanics involved in using a digital computer for simulation. A great deal of research and analysis is being done which includes the construction and use of digital computer simulation models. SIMPAC is designed to implement these models, not to replace them. SIMPAC is not a model. It is something to use in building a model. Since it is impossible to predict the detailed characteristics of models people may want to build, SIMPAC provides great flexibility, the price of which is programming time the user must spend on implementation. One may construct with SIMPAC a highly parameterized model which may serve many or all of his diverse special purposes. For example, a general queueing model or a traffic flow model can be built which is easily manipulated by a non-programmer to fit many special situations in these areas. (Author)

27. PROPULSION SYSTEMS

AD-275 377 Div. 27, 17
(TISTA/GEC) OTS price $7.60

Budd Co., Philadelphia, Pa.
DEVELOPMENT OF HIGH PERFORMANCE ROCKET MOTOR CASE.
Quarterly engineering progress rept. no. 21,
1 Jan-31 Mar 62,
by R. C. Dethloff. 31 Mar 62, 81p. incl. illus. tables.
(Contract DA 36-034-ORD-3296, Proj. OMS-5010-1180800-51-03)
Unclassified report

DESCRIPTORS: Solid rocket propellants, *Rocket cases, Rocket motors, Materials, Alloys, Design, Manufacturing methods, Welding, Arc welding, *Steel, *Nickel alloys, *Titanium alloys, Vanadium alloys, Aluminum alloys, Chromium alloys, Heat treatment, Aging, Arc welds, Mechanical properties, Tensile properties, Tests, Nondestructive testing, Hydrostatic pressure.

Two alloys, Ti-13V-11Cr-3Al (yield strength 195,000 psi) and 20% Ni-steel (yield strength 300,000 psi), were selected as materials for the fabrication of the 20-in. diameter chamber prior to the development of a 40-in. solid rocket propellant case. Fabrication processes used in construction of the test case are described.

AD-275 552 Div. 27, 17
(TISTM/BRW) OTS price $4.60

Army Ordnance Missile Command, Huntsville, Ala.
THE FEASIBILITY OF HIGH STRENGTH ALLOYS FOR THE CONSTRUCTION OF ROCKET MOTOR CASES,
by B. Steverding and G. E. Krick. 7 Nov 61, 47p. incl. illus. tables, 19 refs. (Rept. no. RR-TR-62-2)
Unclassified report

DESCRIPTORS: *Rocket cases, *Materials, Steel, Stainless steel, Tool steel, Titanium alloys, *Alloys, Iron alloys, Nickel alloys, Cobalt alloys, Mechanical properties, Design, Analysis, Stresses, Structures, Heat resistant alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Feasibility studies.

Various newly developed high-strength alloys were examined with respect to their feasibility for rocket motor case construction. The essential material parameters are discussed and incorporated in a formula which has been obtained by means of dimensional analysis. The usefulness of the formula is demonstrated in a table of feasibility factors. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING.

AD-275 450 Div. 28, 5, 13
(TISTB/AW) OTS price $10.50

HRB-Singer, Inc., State College, Pa.
HUMAN ENGINEERING ANALYSIS OF THE AUGMENTED FOUR-WHEELS SYSTEM.
Final rept.,
by George Grant, Robert B. King, and Stephen H. Gates. 1 Mar 62, 128p. incl. illus.
(Contract AF 19(604)7990, Proj. 431L/482L)
(AFCRL 62-90) Unclassified report

DESCRIPTORS: *Human engineering, *Shelters, *Air traffic control systems, Mobile, Standardization, Noise, Illumination, Temperature, Humidity, Communication systems, Air force communications, Military communications, Ground controlled approach radar, Search radar, Radar stations, Radio stations, Maintenance, Operation, Safety, Hazards.

This report is a description of the human engineering aspects of the IFR, Precision Approach Radar (PAR), Airport Surveillance Radar (ASR), Communications and VFR Tower shelters of the ANITSQ-47 System. It describes the layout, equipment configurations, operational functions and ambient conditions for each of these shelters. The final sections outline human engineering recommendations for common aspects of the system and recommendations for future efforts on the system. (Author)

AD-275 492 Div. 28
(TISTB/AW) OTS price $1.60

Connecticut U., Storrs.
IMMEDIATE MEMORY SPANS FOR CVC TRIGRAMS,
by W. A. Bousfield. Jan 62, 11p. incl. illus. tables, 8 refs. (Technical rept. no. 37)
(Contract Nonr-63100)
Unclassified report

DESCRIPTORS: *Memory, *Learning, Theory, Measurement.

Immediate memory spans were obtained for groups of homogeneously meaningful CVC trigrams selected so as to sample the entire range of Archer's norms. The items at the lowest level were nonsense syllables of the lowest possible association value. At the opposite extreme were highly meaningful three-letter words. The design of the study involved the use of two types of instruction, the first calling for the ordering of recall and the second calling for free recall. For each type of instruction there were two modes of recall, namely, spelling and pronunciation. Pronunciation yielded appreciably higher memory spans than spelling. In spite of the freedom permitted in the instructions for free recall, the Ss tended to reproduce the items in the order of their presentation. There was an apparent tendency for the spans to increase with meaningfulness at a positively accelerated rate when the Ss spelled the items. An attempt is made to relate these findings to a group of tenable theoretical assumptions. (Author)

AD-275 493 Div. 28
(TISTB/LH) OTS price $1.10

Connecticut U., Storrs.
THE USE OF FREE ASSOCIATIONAL NORMS FOR THE PREDICTION OF CLUSTERING,
by W. A. Bousfield, J. R. Steward, and T. M. Cowan. Dec 61, 9p. incl. table, 12 refs. (Technical rept. no. 36)
(Contract Nonr-63100)
Unclassified report

DESCRIPTORS: *Psychometrics, *Memory, Learning, Vocabulary, Perception, Tests, Measurement.

AD-275 579 Div. 28, 1
(TISTW/DLW) OTS price $13.50

Minneapolis-Honeywell Regulator Co., Minn.
HUMAN ENGINEERING MAN-MACHINE STUDY OF A WEAPON SYSTEM,
by O. Herb Lindquist and Ronald L. Gross.
Oct 58, 188p. incl. illus. tables, 33 refs.
(MH Aero rept. no. R-ED 6094)
Unclassified report

DESCRIPTORS: *Human engineering, *Instrument dials, *Instrument panels, *Cockpits, *Jet fighters, *Information theory, Display systems, Control systems, Jet planes, Antiaircraft defense systems, Control simulators, Effectiveness, Tests, Sensory perception, Motor reactions.

Research was concerned with the development of an advanced concept or revolutionary cockpit which would allow for ideal operation of a weapon system which utilizes manned interceptors. Discussed are the analysis of the problem, evaluations of suggested displays and a summary of the quantitative work accomplished. The study began with an investigation of the current air defense system employing broadcast control of F89 and F102 interceptors. Preliminary studies were devoted to the specific weapon system problem and establishing a philosophy or approach to the problem. System requirements as to information, accuracy, and pilot action are discussed, and each flight mode of the future interceptor is studied. (Author)

AD-275 813 Div. 28
(TISTB/LH) OTS price $4.60

System Development Corp., Santa Monica, Calif.
EMPIRICAL EXPLORATIONS OF A HYPOTHESIS-TESTING MODEL OF BINARY CHOICE BEHAVIOR,
by Julian Feldman, Fred Tonge and Herschel Kanter. 19 Dec 61, 45p. incl. illus. tables, 13 refs. (Rept. no. SP-546)
Unclassified report

DESCRIPTORS: *Learning, *Data processing systems, *Mathematical prediction, Simulation, Statistical analysis, Probability, Test methods, Perception.

To explore behavior in binary choice experiments, a hypothesis-testing model is employed with subjects represented in a computer program. The basic assumption of this type of model is that the subject is entertaining hypotheses about patterns that he perceives in the random series of events. Various stimuli have been used for events of different experiments e.g., flashes of light, symbols on a deck of cards, spoken words. Results and discussion of simulated experiments are included.

AD-275 851 Div. 28
(TISTB/AW) OTS price $3.60

American Inst. for Research, Santa Barbara, Calif.
SOME EFFECTS OF GRADUATED PARTIAL CUEING ON THE LEARNING OF PAIRED ASSOCIATES,
by Peter M. Guthrie and Arthur A. Lumsdaine.
Sep 61, 34p. incl. illus. tables, 15 refs.
(Research rept. no. AIR-C14-9/61-SR3)
(Contract AF 49(638)681)
(AFOSR-1341) Unclassified report

DESCRIPTORS: *Learning, Theory, Tachistoscopes, Illumination.

The effects of several cueing methods on paired-associates learning were investigated. A total of 48 subjects learned the items in lists of city-names paired with corresponding airport-city codes, using special cueing procedures or standard anticipation procedures. Response terms, presented under lowered conditions of visibility, were the cues. Visibility, and hence cue strength, was varied tachistoscopically or gradually by adjusting illumination of the cue. Under conditions in which subjects had increasing amounts of time to anticipate the response terms, tachistoscopic cueing produced better learning than a comparable anticipation condition. However, the positive effects produced were small. Furthermore, this form of partial prompting was not superior to an immediate full prompt. These results are discussed in relation to needs for further study of graduated cueing techniques in the learning of paired-associate and continuous-discourse materials. (Author)

AD-275 855 Div. 28
(TISTB/AW) OTS price $13.00

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS - AN ANNOTATED BIBLIOGRAPHY. I. BASIC PSYCHOLOGY OF GROUP BEHAVIOR,
by S. B. Sells. Oct 61, 184p. (AAL TR 61-19)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth, Contract AF 41(657)323)
Unclassified report

DESCRIPTORS: *Bibliography, *Sociology, *Group dynamics, *Attitudes, *Leadership, Behavior, Psychology, Perception, Social communications, Reasoning.

This annotated bibliography is part of a bibliographic study of research related to factors contributing to the effectiveness of AC&W sites in Alaska. The annotated bibliographies in this series include the following titles, issued as separate publications: (1) The Basic Psychology of Group Behavior, (2) Dimensions of Group Structure and Group Behavior, (3) Environmental Stress and Behavior Ecology, (4) Organizational Staffing, (5) Organizational Management and Leadership, and (6) Leadership in Formal Groups. The present report, Basic Psychology of Group Behavior, is organized in six sections: (1) General Studies and Reviews, (2) Roles, Status and Intra-Group Interactions, (3) Communication and Information, (4) Individual Perceptions in Group Behavior, (5) Attitudes and Attitude Change, and (6) Methodological Studies. (Author)

AD-275 894 Div. 28
(TISTB/LH) OTS price $11.00

Institute for Social Research, U. of Michigan, Ann Arbor.
COMMUNICATIONS AND DECISION PROCESSES AS DETERMINANTS OF ORGANIZATIONAL EFFECTIVENESS. REPORT OF A FIELD EXPERIMENT.
Final rept.,
by Stanley E. Seashore and David G. Bowers.
Mar 62, 141p. incl. illus.
(Contract AF 49(638)1032)
Unclassified report

DESCRIPTORS: *Operations research, Management engineering, Industrial psychology, Needs, Group dynamics, Applied psychology, Attitudes, Effectiveness, Leadership.

A field experiment was conducted to increase in certain departments of an industrial firm: (1) group-oriented activity, (2) mutual interaction and influence within work groups, (3) supervisory supportiveness in relation to subordinates, and (4) amount of decision-making activity by subordinates. These changes were successfully introduced in three experimental departments in comparison with two control departments. The effects were to increase machine efficiency, and to increase employee satisfactions. Waste performance improved in both experimental and control departments. Absence rates rose overall, but less in the experimental than in the control departments. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-275 850 Div. 29, 16
(TISTB/AW) OTS price $5.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
CONTRIBUTION OF THE E33 HOOD TO HEAT STRESS ON MEN WEARING CBR PROTECTIVE CLOTHING.
Technical rept.,
by F. N. Craig, E. G. Cummings and P. D. Bales.
Dec 61, 54p. incl. illus. tables, 28 refs.
(Rept. no. CRDLR 3101)
Unclassified report

DESCRIPTORS: *Heat production (Biology), *Protective clothing, Gasproof clothing, Stress (Physiology), Body temperature, Humidity.

A physiological evaluation of the hood was made to measure the increment in heat stress produced by the hood when added to the protective assembly under conditions of moderately hard work in hot-humid weather, and the contribution of sunshine to the heat stress. The conclusions are: (1) The E33 hood adds measurably to the heat stress of the CBR protective assembly. The added stress at an environmental temperature of 85 F is about two thirds that of sunshine and about one half that of an increase in the marching speed from 2 to 3 mph. (2) The hood does not interfere with the performance of muscular work of moderate intensity. In the hardest work, the voluntary tolerance time is decreased about one fourth. (3) The heat strain in men working in CBR protective clothing at a given temperature outdoors in the sun can be duplicated indoors at a room temperature 10 F higher than the outdoor temperature. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-275 362 Div. 30
(TISTW/RD) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DESCRIPTION OF TERMINAL BALLISTICS RANGES,
by E. H. Goodman. May 62, 23p. incl. illus. table (Rept. no. AEDC TDR 62-104)
(Contract AF 40(600)800, Proj. 8871)
Unclassified report

DESCRIPTORS: *Hypervelocity guns, *Terminal ballistics, Instrumentation, Aluminum, Cratering, Stresses, Hypervelocity projectiles, Terminal ballistics, Impact shock.

The AEDC Terminal Ballistics Ranges and available instrumentation systems are described. Current launcher performance, instrumentation, and data reduction techniques are presented. (Author)

AD-275 400 Div. 30
(TISTA/GEC) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
MEASUREMENT OF THE PRESSURE FLUCTUATIONS IN THE TEST SECTION OF THE 1-FOOT TRANSONIC TUNNEL IN THE FREQUENCY RANGE FROM 5 TO 1250 CPS,
by J. E. Robertson. May 62, 17p. incl. illus. tables, 2 refs. (Rept. no. AEDC TDR 62-109)
(Contract AF 40(600)800, Proj. 8953)
Unclassified report

DESCRIPTORS: Transonics, *Transonic wind tunnels, Measurement, Pressure, *Oscillation, Frequency.

An investigation was conducted in the 1-foot transonic wind tunnel to determine the pressure fluctuations in the test section. Test results indicated that these pressure fluctuations were near 2% of the free-stream dynamic pressure at Mach number 0.6 and reduced to less than 1% at Mach numbers above 0.8. The frequencies of the pressure fluctuations were near 515 and 1030 cps and were shown to be produced by the tunnel compressor system. A comparison of pressure fluctuations was made with data obtained from a similar investigation conducted in the 16-foot transonic tunnel. (Author)

AD-275 417 Div. 30, 25
(TISTM/REB) OTS price $.75

Atomics International, Canoga Park, Calif.
A HIGH TEMPERATURE THERMAL CONDUCTIVITY APPARATUS,
by R. E. Taylor. Apr 62, 22p. incl. illus. 24 refs.
(Contract AF 33(657)7136, Proj. 4776)
(ASD TDR 62-348) Unclassified report

DESCRIPTORS: *Thermal conductivity, *Laboratory equipment, Design, Measurement, Graphite, Molybdenum, Tantalum, Carbon, Copper, Liquid metals, Iron, Beryllium compounds, Oxides, Magnesium compounds, High temperature research, Titanium compounds, Carbides, Refractory materials.

A high temperature, steady-state thermal conductivity apparatus is described. This apparatus was used to measure the conductivity of diverse materials, such as graphite, metals, carbides, oxides, and liquid copper. Measurements were made from 200 to 2500 C. The procedures used, difficulties encountered, limitations, and accuracy are discussed. Results previously obtained with this apparatus on graphite, molybdenum, tantalum, porous carbon, liquid copper, Armco iron, beryllia, magnesia, and titanium carbide are presented graphically and are compared with other literature results. (Author)

AD-275 434 Div. 30, 27
(TISTM/BRW) OTS price $5.60

Ohio State U. Research Foundation, Columbus.
X-RAY IMAGE SYSTEM FOR NONDESTRUCTIVE TESTING OF SOLID PROPELLANT MISSILE CASE WALLS AND WELDMENTS.
Quarterly progress rept. no. 2, 21 Sep-20 Dec 61, by Robert C. McMaster, Merle L. Rhoten, and Jay P. Mitchell. Dec 61, 50p. incl. illus. table, 4 refs.
(Contract DA 33-019-ORD-3383, Proj. 5B93-32-004)
(WAL TR 142.5/1-2) Unclassified report

DESCRIPTORS: Radiography, *Non-destructive testing, Quality control, Solid rocket propellants, *Rocket cases, Welded joints, Welds, X-ray photography, *Television cameras, *Camera tubes, Television display systems, Thin films, Gold, Selenium, Targets, Thickness.

A television X-ray image enlargement system was developed for in-motion examination of missile case materials and weldments. This system is based upon the use of small-diameter photoconductive television camera tubes as direct sensing edia for penetrating radiations such as X-rays. Ten experiment X-ray-sensitive, 1-in.-diam television camera tubes were evaluated. Five tubes were built to identical specifications to test reproducibility of the tube design. These tubes had similar response characteristics. After the initial tests, 4 of the 5 tubes failed due to target deterioration. The remaining 5 tubes have gold layers of varying thicknesses. The tubes with gold layer thicknesses of 40 to 100 microns have signal current responses inversely proportional to the X-ray source radiation wavelengths up to 200 kv. Tests of a 1-in.-diam light-sensitive camera tube indicate that it has a signal output sensitivity about equivalent to X-ray-sensing tubes with thin Se (8 microns) targets. One of the TK-21C television camera chains was set up to conduct tests of an intermittent scan technique. Results of this test indicate that X-ray-television images can be displayed at low radiation levels (down to 0.0003 r/min) by exposing the camera tube over a long time interval (up to 13 min). (Author)

AD-275 499 Div. 30, 26
(TISTP/WH) OTS price $5.60

RAND Corp., Santa Monica, Calif.
AUTOSATE. AN AUTOMATED DATA SYSTEMS ANALYSIS TECHNIQUE,
by O. T. Gatto. May 62, 50p. incl. illus. tables, 3 refs. (Memo. no. RM-3118-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Data processing systems, *Digital computers, Programming, Automation, Management engineering.

Documentation of an existing system is often required during Air Force data system studies. An automated technique is described that provides information on data system flows and characteristics at the expenditure of considerably less manpower and in a more usable form than was previously possible. This is an interim report on a longer-term study leading to the design of an advanced information system for management of an aircraft/missile base complex in the late 1960's. Since an automated analysis technique for data systems appears to have widespread and immediate use of the Air Force, a preliminary version is described. (Author)

AD-275 529 Div. 30, 24
(TISTE/CAM) OTS price $6.60

Raymond Atchley Div., American Brake Shoe Co., Los Angeles, Calif.
THE DEVELOPMENT OF A PHOTOMEMORY.
Annual summary rept. no. 3, 15 Aug 60-15 Feb 62, by Carl E. Nielsen, Jr. and Carl G. Blanyer. 15 Feb 62, 62p. incl. illus.
(Contract Nonr-266800, Proj. NR 048-136)
Unclassified report

DESCRIPTORS: *Reading machines, *Photographic films, *Machine translation, *Memory devices, *Information retrieval, *Data storage systems, Digital computers, Electronic circuits, Timing circuits, Documentation, Photoelectric cells, Photographic equipment, Data processing systems, Design.

A description of the demonstration reading and writing system is given as well as a description of the computer input device built subsequent to achieving reliable operation from the reading system. The reading system, utilizing five reading channels, was operated with a complete 2 x 2 inch data plate containing 0.004 x 0.016 inch bits. An address was set into the reader by a toggle-switch register and the data plate scanned. Upon coincidence between the address and the scanned data, the data was visually displayed on a lamp bank. Writing experiments have been carried further in testing the glow modulator tube driver. The ambient light level from the glow modulator tube was eliminated thus allowing a higher contrast to be obtained. An input device for the IBM 1620 computer was built. This unit utilized nine reading channels and a 2 x 2 inch data plate containing 0.005 x 0.010 inch bits. The unit was designed to present information to the 1620 at an average rate of 8000 digits per second. (Author)

AD-275 534 Div. 30, 28
(TISTP/TL) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
THE LOGIC OF AN APPROACH TO THE ANALYSIS OF COMPLEX SYSTEMS,
by K. H. Schaeffer. Apr 62, 42p. 19 refs.
(Contract AF 49(638)1020)
(AFOSR-2136) Unclassified report

DESCRIPTORS: *Cybernetics, *Control systems, Information theory, *Human engineering, *Mathematical logic, Nets, *Operations research, Feasibility studies.

The analysis of complex man-machine systems is discussed. This approach assumes that systems can be divided into elements and their direct relations, where the elements include the components and the processes of the system, as well as the factors external to the system which determine it. The elements and direct relations are used to construct a representative network of the system. The system is then analyzed by means of one or more mathematical models. These models are evaluated against the network for their completeness in representing the system. Elements and direct relations which were not modeled or were only inadequately modeled are then described by less formal means. In the final step, the mathematical models and the additional descriptions are judgmentally integrated by the analyst. (Author)

AD-275 535 Div. 30, 28, 15
(TISTP/TL) OTS price $3.60

Scope, Inc., Falls Church, Va.
DEVELOPMENT OF AN ADVANCED CONDITIONED REFLEX MODEL.
Quarterly progress rept. no. 2, 21 Feb-20 May 62. 20 May 62, 30p. incl. illus. tables, 2 refs.
(Contract AF 33(657)7509, Proj. 4040)
Unclassified report

DESCRIPTORS: Feasibility studies, *Conditioned reflex, Magnetic tape, *Memory devices, Feedback, Control systems, Design, *Mathematical logic, Computer logic, Sequences, Coding, Programming, Switching circuits, Computers, Phototubes, Resistors, Statistical analysis, Probability, Sampling, Simulation, Statistical distributions, *Information theory, Data storage systems.

The design and construction of an advanced laboratory conditioned-reflex model to demonstrate the feasibility of a conditioned-reflex system for ECM automatic mode selection. The organization of the model consists of a sensory field connected to a discrimination field which, in turn, is connected to several memory planes. Each memory plane is assigned to a class of inputs and a response is evoked by correlating the stored information with input information. This analysis includes a proposed acceptance test procedure and a discussion for uses of the machine in the laboratory. It also emphasizes the thought given to demonstrating the capability of the hardware model. (Author)

AD-275 583 Div. 30
(TISTP/AW) OTS price $4.60

Coordinated Science Lab., U. of Illinois, Urbana.
THE IDENTIFICATION OF LINEAR SYSTEM WITH AN ASSESSMENT COMPUTER,
by Maurice E. Suhre, Jr. 1 May 62, 43p. incl. illus. 15 refs. (Rept. no. R-139)
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: *Linear systems, *Signal-to-noise ratio, Identification, Control systems, Computers, Effectiveness, Errors, Statistical functions, Calculus of variations, Integral transforms, Integral equations, Integration.

A method of determining the impulse response of a linear system is applied to process identification for adaptive control. The method uses a special test signal and a corresponding estimating filter. The noise present at the output of the estimating filter is reduced by an assessment computer. The assessment computer does no processing until the entire estimate is available. Thus it is able to interpolate to estimate the noise. The effectiveness of the assessment computer is analyzed using knowledge of the statistics of the noise. Finally, the optimum test signal spectrum is obtained by minimizing the expected mean square error for a specified assessment policy. (Author)

AD-275 616 Div. 30, 15, 22
(TISTP/JW) OTS price $6.60

Philco Corp., Palo Alto, Calif.
ANALOG COMPUTER STUDIES.
Final rept.,
by Peter L. Besag. Apr 62, 61p. incl. illus. 17 refs. (Rept. no. WDL TR-E109)
(Contract AF 30(602)2335, Proj. 4519)
(RADC TDR 62-26) Unclassified report

DESCRIPTORS: *Doppler tracking, *Analog systems, Analog computer, Computers, Design, Circuits, Simultaneous equations, Electronic equipment, Data transmission systems, Matrix algebra.

Analog techniques for doppler tracking systems are explored. A number of applicable models and components were designed and their behavior studied. An analog computer circuit was developed for a 4-station, 3-reading doppler tracking system. This circuit was shown to yield a solution of the system equations. It was shown that it is stable and convergence was non-oscillatory. The method used is applicable to any set of simultaneous nondifferential equations. It is believed to be a new and unique contribution to the art of analog computer design. (Author)

AD-275 649 Div. 30
(TISTP/JW) OTS price $10.50

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
ANALOG-DIGITAL COMPUTERS FOR REAL-TIME SIMULATION,
by Mark E. Connelly. 19 Feb 62, 132p. incl. illus. tables, 55 refs.
(Contract N61339-594)
(NAVTRADEVCEN rept. no. 594-1)
Unclassified report

DESCRIPTORS: *Analog systems, *Digital systems, *Computer logic, *Effectiveness, Analysis, Simulation, Analog computers, Digital computers, Design, Costs.

The relative advantages of analog and digital computational techniques as applied to the problem of real-time aircraft simulation are discussed. The hypothesis is presented that a basic digital computer is feasible today that would compete with analog techniques on both cost and ability to simulate natural aircraft frequencies in real time. It is possible that the digital or hybrid computer will supplant the analog computer in those problem classes requiring more than 100 amplifiers. The concept of high-speed, time-shared analog computing elements operating under the control of a digital computer is introduced. A family of such elements is described as well as various system design studies and experimental demonstration systems. The design of an analog-digital computer utilizing the pulsed-analog concept is outlined. The advantages and disadvantages of floating-point arithmetic are discussed. Illustrative programs are presented for function generation, trigonometric resolution, and the solution of a typical aerodynamic equation. It is concluded that the use of peripheral pulsed-analog equipment would increase the effective computing speed of a given digital computer on simulation problems by a factor of two or more. (Author)

AD-275 715 Div. 30, 5
(TISTB/AW) OTS price $9.10

Parke Mathematical Labs., Inc., Carlisle, Mass.
ANNOTATED BIBLIOGRAPHY ON ERROR CORRECTING CODES.
Dec 61, 94p. (Scientific rept. no. 4)
(Contract AF 19(604)7493)
(AFCRL 62-101) Unclassified report

DESCRIPTORS: *Bibliography, *Errors, *Corrections, *Coding, *Communications theory, Theory, Applied mathematics, Circuits, Digital systems.

AD-275 740 Div. 30
(TISTA/GEC) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A DEVICE FOR MEASURING HEAT TRANSFER RATES IN ARC-DISCHARGE HYPERVELOCITY WIND TUNNELS,
by R. L. Ledford. May 62, 29p. incl. illus.
(Rept. no. AEDC TDR 62-64)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, Instrumentation, Electric arcs, Transducers, *Thermocouples, Sensitivity, Effectiveness, Heat transfer, Measurement.

Heat-transfer-rate is one of the fundamental aerodynamic parameters which must be measured in Hypervelocity wind tunnel testing. Transducers which can perform this measurement are not commerically available; therefore a device which can be employed for this purpose has been developed. This device can measure transient rates ranging from 1 to 1000 Btu/sq. ft. sec for periods of 5 to 80 millisec; it does not require run-to-run calibration; and it is durable enough to withstand many tunnel runs without maintenance. Its performance has been proven through laboratory and tunnel tests and usage. (Author)

AD-275 743 Div. 30
(TISTA/GEC) OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE AERODYNAMIC CALIBRATION OF THE AEDC PWT 16-FOOT SUPERSONIC TUNNEL COMPRESSOR,
by W. E. White and C. L. Garner, Jr. May 62, 43p. incl. illus. tables, 6 refs. (Rept. no. AEDC TDR 62-91)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Supersonic wind tunnels, Compressors, *Axial flow compressors, Aerodynamics, Design, Calibration, Operation, Pressure.

The aerodynamic performance of the Propulsion Wind Tunnel Facility's 16-Ft Supersonic Tunnel compressor was investigated at an inlet temperature of approximately 100 F and a tunnel stagnation pressure of 500 psf at the design speed of 600 rpm. The over-all performance of the four cylinder configuration was considerably improved when the fourth cylinder stator blades were changed from -14 to -5 degrees. This change increased the maximum four cylinder pressure ratio from approximately 6.30 to 7.45 and increased the inlet volume flow approximately five %. The maximum pressure ratio available is 2.80 at 160,000 cfs, 4.08 at 152,000 cfs, and 7.45 at 164,000 cfs for two, three, and four cylinders, respectively. The peak pressure ratio performance of the prototype for the two and three cylinder configurations is greater than that predicted by Westinghouse. In the four cylinder configuration this peak pressure ratio is approximately 1.5 below the theoretical estimate. It was also noted that the prototype results exhibit a 12,000 to 15,000 cfs loss in maximum inlet volume flow when compared to the estimate. (Author)

AD-275 814 Div. 30, 8
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
MAXIMUM-DEPTH INDEXING FOR COMPUTER RETRIEVAL OF ENGLISH LANGUAGE DATA,
by Robert F. Simmons and Keren L. McConlogue.
10 Apr 62, 22p. incl. illus. tables, 5 refs.
(Rept. no. SP-775)
Unclassified report

DESCRIPTORS: *Information retrieval, *Information theory, Indexes, Language, Computer logic, Programming.

One of the simplest and yet most powerful methods for organizing natural language data for deep retrieval is the complete index. Such an index completely characterizes a text corpus for computer retrieval operations without prohibitive cost in space or time. A general-purpose indexer programmed for the IBM 7090 is described and discussed. This system, starting with unedited English text, produces an index of all or any subset of words in that text. For each word indexed, the volume, chapter, paragraph and sentence number for each of its occurrences in the text is cited. Words with the same root, such as farmer and farming, are cross-referenced to each other. Words that are almost precisely synonymous such as Britain and England are also cross-referenced. Uses of the index for finding information relevant to answering English questions are briefly described. (Author)

AD-275 822 Div. 30
(TISTP/TL) OTS price $7.60

System Development Corp., Santa Monica, Calif.
THE JOVIAL MANUAL: PART 2, REVISION 1. THE JOVIAL GRAMMAR AND LEXICON.
Technical memo.,
by C. J. Shaw. 9 June 61, 77p. (Technical memo. no. TM-555/002/01)
Unclassified report

DESCRIPTORS: *Programming, *Language, Coding, Data storage systems, Computers, Information retrieval.

The JOVIAL Grammar and Lexicon, is a complete, concise, and rigorously formal description of JOVIAL, an SDC-designed, procedure-oriented, programming language. It is intended mainly as a reference for programmers already familiar with the language. The Grammar describes the syntax or appearance of JOVIAL, while the Lexicon describes the semantics or meaning of JOVIAL. The Lexicon, which is interleaved with the Grammar, attempts to ascribe a precise meaning to every 'grammatical' JOVIAL program by describing the computing rule denoted by the program. In this it is not entirely successful, for the interpretation of some few JOVIAL expressions (especially in the input-output area) necessarily varies from computer to computer so that these expressions must remain undefined. Machine independent programming can be achieved, however, by avoiding undefined constructions. (Author)

AD-275 823 Div. 30
(TISTP/TL) OTS price $3.60

System Development Corp., Santa Monica, Calif.
A PROGRAMMER'S INTRODUCTION TO BASIC JOVIAL.
Technical memo.,
by C. J. Shaw. 7 Aug 61, 39p. (Technical memo. no. TM-629)
Unclassified report

DESCRIPTORS: *Programming, *Language, *Computers, Control systems, Digital computers, Coding, Data storage systems, *Information retrieval.

Descriptions are given of the basic elements of JOVIAL, a procedure-oriented and largely computer-independent programming language designed by the System Development Corporation for computer-based command/control systems. JOVIAL is derived from ALGOL 58, with the addition of an input-output notation, a more elaborate data-description capability, and the ability to manipulate symbolic and other non-numeric values. (Author)

AD-275 824 Div. 30
(TISTP/TL) OTS price $10.10

System Development Corp., Santa Monica, Calif.
RESEARCH DIRECTORATE REPORT BY THE RESEARCH DIRECTORATE STAFF.
Technical memo.,
by Launor F. Carter and J. D. Madden. Jan 62, 130p. incl. illus. table (Technical memo. no. TM 530/004/00)
Unclassified report

DESCRIPTORS: *Research program administration, *Operations research, *Simulation, Programming, Computers, *Mathematics, Data processing systems, Costs, *Human engineering, Mathematical prediction, Automation, Control systems, Communications systems, Statistical analysis, Man, Machines, Management engineering.

AD-275 826 Div. 30
(TISTP/MFA) OTS price $14.50

System Development Corp., Santa Monica, Calif.
THE JOVIAL MANUAL. PART 3. THE JOVIAL PRIMER.
Technical memo.,
by C. J. Shaw. 26 Dec 61, 216p. incl. illus.
(Technical memo. no. 555/003/00)
Unclassified report

DESCRIPTORS: *Digital computers, *Control systems, *Language, *Programming, Coding, Sequences, Data storage systems, Algebras, Information theory, Switching circuits, Scheduling, Operators (Mathematics), Polynomials, Indexes, Machine translation, Tests.

A text on JOVIAL programming, with many examples and exercises, is given. The treatment is such that an experienced programmer should have little trouble in comprehending the subject matter, although a beginner might require some additional tutoring. Answers to the exercises in the Primer will be found in Part 4, Supplement to the JOVIAL Manual. Although the Primer contains all of the information found in Part 2, the Grammar and Lexicon, it is not meant to supersede that document, since the organization of material in the two documents differs considerably. The Primer is organized so that, in general, simple topics are presented first, more difficult (and less useful) topics later. The Grammar, on the other hand, obeys the heirarchical structure of the language and is organized for reference. As an aid to legibility in the examples, lower case as well as upper case letters will be used though, of course, JOVIAL itself contains no such distinction. Lower case letters will be used within comments and to expand the abbreviations that the language employs. (Author)

AD-275 827 Div. 30
(TISTP/MFA) OTS price $3.60

System Development Corp., Santa Monica, Calif.
THE LEVIATHAN TECHNOLOGICAL SYSTEM FOR THE PHILCO 2000 COMPUTER.
Technical memo.,
by S. C. Rome and B. K. Rome. 11 Apr 62, 31p. incl. illus. (Technical memo. no. TM-713)
Unclassified report

DESCRIPTORS: *Computers, *Programming, *Operations research, Technological intelligence, Control systems, Communication systems, Data storage systems, Information retrieval, Management engineering, Sequential analysis.

The technological system, the Leviathan Executive Command study, currently being programmed for the Philco 2000 computer is described. It is a simplified version of a system already operational on the IBM 7090. This system is adapted to the limitations of the 2000 computer. While the new system therefore lacks several of the functions of the previous one, the programming required for it is in some ways even more sophisticated. What justifies the elaborate effort of adapting Leviathan to the 2000 is that the new programs take advantage of the special buffering equipment now coming into operation. Together with the special Leviathan EXCOM equipment designed for the Laboratory, the new programs permit the Leviathan project to operate in real time with live subjects. (Author)

AD-275 836 Div. 30, 25, 2
(TISTP/MFA) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
GRAPHICAL DATA PROCESSING RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION.
Quarterly progress rept. no. 7, 1 Dec 61-28 Feb 62,
by A. E. Brain and G. E. Forsen. Mar 62, 34p. incl. illus. 16 refs.
(Contract DA 36-039-sc-78343, Proj. 3A99-22-001-02)
Unclassified report

DESCRIPTORS: *Data processing systems, *Maps, *Aerial photographs, Transformations, Feasibility studies, Piezoelectric materials, Transducers, Analog computers, Magnetic cores, Magnetostriction, Photoemission, Sampling, Optical systems, Mirrors, Lenses, Design, Electrical networks, Resistance, Optical images, Wave transmission, Delay lines, Photographs, Tests.

Consideration is given to translating graphical input data to electrical signals for a pattern recognition system. Resistance network matrices are rejected as cumbersome, expensive, and prone to sneak paths; the possibility of using manifold optical images and masks is explored and shown to be promising. Means of generating images to lie in a single plane are investigated. The optical tunnel is rejected as overly-expensive and the Fly's Eye array of simple lenses shown to be adequate and easily achievable. Two quasi-analog magnetostrictive-drive delay line storage units with nondestructive readouts are described; these units are suitable for use in pattern recognition. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-275 421 Div. 31, 33
(TISTB/AW) OTS price $1.60

California U., Los Angeles.
TECHNICAL STUDIES IN CARGO HANDLING. VIII. RE-EXAMINATION OF AUTOMATED SHIPS,
by Raymond L. Erler and Jack K. Weinstock. Apr 62, 11p. incl. illus. tables, 4 refs.
(Rept. no. 61-68)
(Contract Nonr-23307)
Unclassified report

DESCRIPTORS: *Cargo ships, Automation, Costs, Maintenance, Handling, Electronic systems, Reliability, Automatic navigators, Control.

The economic problem of automating ships, using some of the experience gained in developing electronic military systems, is explored. The proposed concept consists of a freighter which would be controlled and navigated automatically by shipborne instrumentation and would be monitored by means of telemetered communication to a shore-based human operator. If necessary the operator could override the shipborne control and control the ship remotely by a radio link. At sea, the automatic computer control would navigate the ship according to a programmed course. When the ship neared its destination it would stop automatically to await the pilot who would board and take over manual control, to complete the docking of the vessel. Although the ship would be internally controlled, i.e., redirecting its course as it senses various environmental and internal conditions, there would be a land-based monitoring station. The station would receive telemetered information on the ship's position, course, speed, engine parameters and fuel level. (Author)

AD-275 569 Div. 31, 27
(TISTP/JW) OTS price $9.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HYDRODYNAMICS AND STABILITY AND CONTROL OF A TANDEM PROPELLER SUBMARINE.
Interim rept. no. 1, 16 Oct 61-25 Mar 62, by F. Dell'Amico and L. Segel. 26 Mar 62, 94p. incl. illus. tables, 10 refs. (CAL rept. no. AG-1634-V-1)
(Contract Nonr-365900)
Unclassified report

DESCRIPTORS: *Submarines, *Stabilization systems, *Hydrodynamics, *Propeller blades, Propulsion, Pitch, Thrust, Control systems, *Variable pitch propellers, *Marine propellers, Feasibility studies, Automatic, Stability.

Hydrodynamic and stability and control characteristics are investigated for a novel submarine configuration employing tandem, large hub-to-diameter ratio propellers whose blades are pitched collectively and cyclicly. Stability coefficients for the hull and the propeller are derived. Expressions for the control forces and moments generated by the propellers are developed and the perturbation equations of motion are used to analyze the controlled dynamics of the submarine. An analysis of the motions in the vertical plane indicates that the submarine can be stabilized at high speeds by automatic control of collective and cyclic pitch and that reasonable maneuverability can be obtained. (Author)

AD-275 570 Div. 31, 27
(TISTP/JW) OTS price $12.50

Electric Boat Div., General Dynamics Corp., Groton, Conn.
PITCH CHANGING SYSTEMS FOR THE TANDEM PROPELLER.
Interim rept. no. 1.
31 Mar 62, 118p. incl. illus. tables (Rept. no. U413-62-092)
(Contract Nonr-338300, subcontract to General Electric Co., and Elliott Co.)
Unclassified report

DESCRIPTORS: *Submarines, *Propulsion, *Propeller blades, Pitch, Thrust, Control systems, Electric motors, Variable pitch propellers, Marine propellers, Feasibility studies, Generators, Design.

A study is made of a turboelectric submarine propulsion system incorporating tandem propellers at the ends of the ship. The propellers are driven by free-flooding motors located in the propeller hubs. Propeller blades are arranged to be continuously controllable in pitch individually and hence provide directed thrust for ship control. Design requirements for machinery and pitch changing systems are developed, and the feasibility of the concept is evaluated. (Author)

AD-275 580 Div. 31, 28
(TISTE/CDM) OTS price $5.60

Minneapolis-Honeywell Regulator Co., Minn.
ON THE STABILITY AND MANUAL CONTROLLABILITY OF THE TANDEM PROPELLER SUBMARINE.
Interim rept. no. 1,
by J. M. Huntington and R. C. McLane. 30 Mar 62, 48p. incl. illus. table (MH Aero rept. no. 1936-TR1)
(Contract Nonr-367500)
Unclassified report

DESCRIPTORS: *Submarines, *Hydrodynamics, *Marine propellers, *Control systems, *Display systems, *Human engineering, Control, Simulation, Tests, Stability.

A preliminary exploration was made of man's capacity to control a six-degree-of-freedom vehicle with the expected dominant dynamic response characteristics of a tandem propeller submarine. An experiment to determine the informational requirements was conducted using a sufficient number of subjects to indicate whether or not a human operator can control a problem of this magnitude. Included are a description and analysis of the data collected, their meaning with respect to the development of displays for the most efficient presentation of required information to the operator, and the development of an optimum control and stability augmentation system for the vehicle. (Author)

AD-275 892 Div. 31, 9
(TISTP/WH) OTS price $3.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PERFORMANCE OF SUPERCAVITATING PROPELLER ON ONR HYDROFOIL BOAT XCH-6 (DTMB PROPELLER 3785).
Mar 62, 30p. incl. illus. tables, 2 refs.
(Rept. no. MPD 47.134)
(Contract Nonr-269500)
Unclassified report

DESCRIPTORS: *Hydrofoil boats, *Marine propellers, *Cavitation, Drag, Thrust.

The open-water performance of the 10-inch supercavitating propeller installed on the Office of Naval Research Hydrofoil Craft XCH-6 is described. Within the limits of accuracy obtainable on an open-water test vehicle, performance of the installed propeller compares favorably with model test data. Torque and thrust coefficients of the installed propeller were slightly lower than anticipated from the model tests, while propeller efficiencies for foilborne speeds to 43.5 knots (50 mph) were approximately 7 to 8 units higher than anticipated. Trends of these data with respect to speed (from 30.4 knots to 43.5 knots - 35 to 50 mph) agree closely with the model tests. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-275 393 Div. 32
(TISTB/AW) OTS price $16.50

Documentation, Inc., Washington, D. C.
THE STATE OF THE ART OF COORDINATE INDEXING,
by Josephine J. Jaster, Barbara R. Murray, and Mortimer Taube. Feb 62, 256p. incl. illus. tables, 12 refs.
Unclassified report

DESCRIPTORS: *Indexes, *Information retrieval, *Subject headings, Classification, Information theory, Special functions, Theory, Bibliography, Vocabulary, Growth, Automation, Coding, Microfilm, Computers, Magnetic tape.

Coordinate indexing in this study is defined to include all systems in which the logical operation of intersection, union, and negation are brought into play in the manipulation of index terms. This therefore covers nearly every mechanized system. It includes both term-on-item and item-on-term systems. It excludes only those systems which are precoordinated, i.e., nonmanipulative. Whether systems use uniterms, keywords, descriptors, unit concepts, or structerms, they are included in this study. A distinction is made between pure and constrained systems, but not so as to eliminate the latter from the study. In the chapter on roles and links, although there is an attempt to distinguish among the various kinds of roles zd links, none is omitted because it does not fit a particular definition. Each section has its own reference-footnotes. However, at the end of the report there is an annotated bibliography of the more significant papers that were published between 1947 and 1960. (Author)

AD-275 439 Div. 32, 8, 14, 25
(TISTM/BRW) OTS price $9.10

Hughes Aircraft Co., Culver City, Calif.
INFORMATION RETRIEVAL PROGRAM. ELECTRONIC/ELECTRICAL PROPERTIES OF MATERIALS.
Quarterly progress rept. no. 3, Jan-Mar 62,
by E. M. Wallace. 15 Apr 62, 1v. incl. illus. tables (Document no. 5171.2/32)
(Contract AF 33(616)8438)
Unclassified report

DESCRIPTORS: Materials, *Semiconductors, *Dielectrics, Electric insulation, Documentation, Abstracting, Classification, Scientific reports, *Data processing systems, Electrical properties, Dielectric properties, Data, Indexes, Literature, Dictionaries, Programming.

The report summarizes work in Phase II performance of the tasks of the information retrieval program. Documentation work involved the searching of more than 20,000 titles and abstracts, acquisition of more than 4600 pieces of literature, abstracting of more than 2400 titles and indexing of 1800 titles. Compilation and evaluation was initiated for 9 materials of which three are completed. Data sheet preparation is in process for the three completed materials. For the electrical insulation materials category an auxiliary aid was developed in the form of an alphabetical list of names established for the index and alternative forms of these names including trade names. (Author)

AD-275 465 Div. 32, 15
(TISTP/TL) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
A PROBABILISTIC METHOD FOR PHRASE DETERMINATION.
Technical rept. on Mathematics,
by Edward Gammon. Mar 62, 36p. incl. illus. tables, 18 refs. (Rept. no. 6-90-62-24)
Unclassified report

DESCRIPTORS: *Statistical processes, *Languages, Literature, Speech, Vocabulary, Sequences, Mathematical prediction, Tables, Probability, Information theory.

The model is stochastic but does not require any Markov assumption, although an implication of that approach is discussed. It is assumed only that a sequence of parts of speech of the words of a large sample text or corpus is the realization of some stationary stochastic process. Under this assumption, with the system of parts of speech suitably defined, it is shown that phrase and sentence boundaries tend to occur where prediction of future grammatical forms, given immediate forms, is most difficult. (Author)

AD-275 785 Div. 32
(TISTB/AW) OTS price $10.10

RAND Corp., Santa Monica, Calif.
THE SOVIET AGRICULTURAL PROGRAM. AN EVALUATION OF THE 1965 GOALS,
by D. Gale Johnson and Arcadius Kahan. May 62, 111p. incl. tables, refs. (Memo. no. RM-2848-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Economics, *Agriculture, *Animal industry, *USSR, Labor, Tables, Climatic factors.

This study evaluates the feasibility of the Seven Year Plan goals for 11 basic agricultural commodities (grain, potatoes, vegetables, oil seeds, sugar beets, cotton, flax fiber, meat, milk, eggs, and wool). The planned increase in aggregate output of these commodities between 1958 and 1965 is 62 per cent when outputs are valued at 1958 procurement prices. Over four-fifths of the planned increase is accounted for by feed and livestock products. The authors' estimates assume that sown area will increase by not more than 10 per cent, that machinery inputs will approach the planned level, that mineral fertilizer inputs will be about 30 per cent below plan, and that there will be significant improvements in efficiency. The goals for the technical or industrial crops (cotton, flax fiber, oil seeds, and sugar beets) can probably be met if they receive top priority. The estimated increase in feed might permit an increase in livestock output of 36 per cent (far below plan). Assuming normal weather, aggregate output of the 11 commodities considered might increase by 24 per cent (compared with the planned increase of 62 per cent). (Author)

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

AGRICULTURE

TID-15219 $2.60

Ohio Agricultural Experiment Station, Wooster.
CONTINUING BIOCLIMATIC AND SOILS INVESTIGATIONS IN FOREST ENVIRONMENTS, by Gareth E. Gilbert. Technical progress rept. 15 June 61-14 June 62, on Contract AT (11-1)-552. 23p.

ASTRONOMY

NASA N62-11435 $1.60

Space Astronomy Lab., U. of Wisconsin, Madison.
X-15 QUARTERLY REPORT. Interim progress rept. for 1 Jan-31 Mar 62, on NASA Contract NASw-66. 15 Apr 62 [11]p.

Astrophysics

PB 160 498 $1.60

Directorate of Labs., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
PHYSICAL AND POSITIONAL PROPERTIES OF THE PLANETS, by Gilbert F. Arthur. 1 Dec 58, 17p. 13 refs. WADC Technical note 58-347; AD-206 671.

DESCRIPTORS: *Planets, Physical properties, *Astronomical data, Earth, Moon, Climate, Position finding, Tables.

A compilation is presented of the most probable and consistent values of terrestrial, lunar and planetary properties in the form of tables which will serve as a ready reference of quantitative and qualitative data, useful individually and as bases for making interplanetary comparisons.

NASA N62-11549 (K) $1.10

High Altitude Observatory, Boulder, Colo.
SOLAR RADIO STORM ON 6 SEPTEMBER 1961, by R. E. Skerjanec, D. A. Wightman, and J. W. Warwick Rept. on NASA Grant NsG-136-61. 24 Apr 62, 7p. 2 refs.

NASA N62-11754 $18.50

New Mexico U. Engineering Experiment Station, Alburquerque.
RADAR BACK-SCATTER THEORIES FOR NEAR-VERTICAL INCIDENCE AND THEIR APPLICATION TO AN ESTIMATE OF THE LUNAR SURFACE ROUGHNESS, by Harbhajan S. Hayre and Richard K. Moore. Rept. on NASA Grant NsG-129-61. Jan 62, 291p. 167 refs. EE-67.

NASA N62-11284 $8.60

Rand Corp., Santa Monica, Calif.
STUDIES OF THE PHYSICAL PROPERTIES OF THE MOON AND PLANETS, comp. and ed. by M. H. Davis. Quarterly technical progress rept. no. 3 on JPL Contract N-33561 and Contract NASw-6. 28 Apr 61, 97p. RM-2769-JPL.

BEHAVIORAL SCIENCES

AD-264 764 $3.60

Armed Forces-NRC Committee on Hearing and Bio-Acoustics [Washington, D. C.]
EFFECTS OF AIRCRAFT NOISE IN COMMUNITIES. NOTES ON AVAILABLE DATA AND ON PROBLEM AREAS FOR FURTHER STUDY, by K. N. Stevens, P. N. Borsky and others. Rept. on Contract Nonr-2300(05). Oct 61, 32p. 19 refs.

DESCRIPTORS: *Airplane noise, Sociology, Psychology, Physical properties, Population, *Psychoacoustics, Hearing, Speech, Sleep.

Available information is summarized concerning the effects of aircraft noise on people in communities. A general model is presented in order to show the main variables relevant to the community noise problem and to indicate the interrelations that must be quantified before a scheme for predicting community response to aircraft noise can be developed. Data on the physical characteristics of aircraft noise in communities are summarized. The noise is shown to cause negligible permanent effects on hearing. Significant effects on speech and listening, and on sleep and rest, however, have been observed in areas close to busy airports. The influence of socio-psychological factors on community response to aircraft noise is known to be appreciable, but only a small amount of quantitative data on these factors has been gathered. (Author)

AD-275 855 repriced $3.00

Texas Christian U., Fort Worth.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS: AN ANNOTATED BIBLIOGRAPHY. I. BASIC PSYCHOLOGY OF GROUP BEHAVIOR, by S. B. Sells. Rept. on Contract AF 41(657)323. Oct 61, 189p. 157 refs. AAL Technical rept. 61-19.

DESCRIPTORS: *Bibliography, Abstracting, *Military personnel, Aviation personnel, Personnel, *Group dynamics, *Stress (Psychology), Separation, Attitudes, Leadership, Sociology, Behavior, *Psychology, Military organizations, Alaska.

BIOLOGICAL SCIENCES

TID-15406 $1.60

California U., Los Angeles. School of Medicine.
THE PHARMACOLOGY AND TOXICOLOGY OF SCANDIUM CHLORIDE, by Thomas J. Haley, N. Komosu and others. Rept. on Contract AT(04-1)-GEN-12. 26 Mar 62, 13p. 13 refs.

NASA N62-11127 $1.10

General Mills Electronics Group, Minneapolis.
RESEARCH TO DETERMINE THE EXISTENCE AND IDENTITY OF VIABLE MICROORGANISMS IN THE STRATOSPHERE, by V. William Greene. Quarterly status rept. no. 1, 1 Jan-31 Mar 62 on NASA Contract NASr-81. Apr 62, 7p.

TID-15279 $1.60

New England Center Hospital, Boston, Mass.
DEVELOPMENT OF SMALL IN VIVO β-RAY DETECTORS AND THEIR DIAGNOSTIC APPLICATIONS. Progress rept. on Contract AT(30-1)-1726. 12 Mar 62, 8p.

TID-15355 $14.00

Wabash Coll., Crawfordsville, Ind.
ECOLOGIC STUDIES OF A RIDGE FOREST AND ADJACENT FLOOD PLAIN, PARKE COUNTY, INDIANA. Final rept. June 57-May 61, on Contract AT (11-1)-547. 202p. 39 refs.

Anatomy and Physiology

PB 160 036 $1.60

Aerospace Medical [Div.] Wright Air Development Div., Wright-Patterson AFB, Ohio.
AN APPARATUS FOR DETERMINING CRITICAL FUSION FREQUENCIES AND OTHER PSYCHOPHYSICAL FUNCTIONS IN VISION, by Aaron Hyman. Rept. on Human Performance in Advanced Flight. Mar 60, 13p. WADD Technical note 60-129; AD-243 611.

DESCRIPTORS: Design, *Vision, *Optical instruments, Test equipment, Measurement, Visual perception, Psychology, Stimulation.

An apparatus suitable for studying the critical fusion frequencies (CFF) of periodic visual stimuli is described. With minor modification in its design, it may also be used for investigating other visual functions. The apparatus permits independent control of both target and surround for a number of stimulus dimensions. For foveal CFF studies, it presents a monocular view of a 52-minute-of-arc circular field of fluctuating light surrounded, when desired, by an annulus of steady light. The fluctuating light is comprised of two beams independently controlled with respect to spectral energy distribution, luminance level and temporal pattern of presentation. By utilizing the Maxwellian view, the apparatus provides a maximum retinal illuminance of approximately 10^7 trolands. (Author)

AD-268 031 $1.25

Air Force Cambridge Research Labs., Bedford, Mass.
SOME METRIC CONSIDERATIONS IN THE PATTERN RECOGNITION, by Theodore A. Kalin. July 61, 45p. 60 refs. AFCRL 327.

DESCRIPTORS: Learning, Visual acuity, *Nervous system, Computers, *Information theory, Mathematical logic, Digital computers, Automation, Mammals, Optics, *Optic nerve, Optic tracts, Combinational analysis, Groups (Mathematics), Measure theory, Topology.

The lack of traceable nerve pathways in the visual cortices of mammals has, in the last decade, generated speculation about machines which might learn to recognize visual patterns but which would be randomly wired to their source of information. This report analyzes such devices and shows that at least certain mild constraints of a distance-ordering sort must be imposed upon random connections. Mammalian visual system neuroanatomy is then re-examined in this light. (Author)

NASA N62-11803 $5.60

Operations Research, Inc., Silver Spring, Md.
THE FEASIBILITY OF ESTIMATING THE ENERGY EXPENDITURE OF ASTRONAUTS THROUGH PARTIAL SIMULATION OF WEIGHTLESSNESS, by Barry G. King and Mitchell C. Mans. Rept. on NASA Contract NASr-170. 28 Feb 62, 52p. 6 refs. Technical rept. no. 170.

Biochemistry

AD-261 758 repriced $1.00

George Washington U., Washington, D. C.
EFFECT OF LIPOTROPIC FACTORS ON COLD PHYSIOLOGY, by Carleton R. Treadwell. Apr 61, 40p. 15 refs. AAL Technical rept. 60-18.

DESCRIPTORS: *Physiology, *Exposure, *Diet, *Liver, Tissue (Biology), Muscles, Experimental data, Laboratory animals, Ketones, *Metabolism, Vitamins, *Growth, Stress (Physiology), *Lipids, Blood, Proteins, *Lipoproteins, Nutrition, Cholesterol, Acidosis, Phospholipids

Several experiments have been carried out to study the lipotropic effect of cold upon fatty livers produced by deficiencies of methyl donors. It was found that at 1 C, diets containing as little as 5% protein and as much as 40% fat did not produce the fatty livers characteristic of these diets when fed at 25 C. It was also

found that when animals with fatty livers were maintained at 1 C, there was a marked lipotropic effect without any change in diet composition. Cold also has both curative and preventive lipotropic effects on the triglyceride fraction of the livers of animals receiving diets which will produce cholesterol fatty livers. Other experiments suggest that animals at 1 C undergo an adjustment such that either larger amounts of ketone bodies can be metabolized or fewer ketone bodies are produced. (Author)

TID-14432 $1.10

Johns Hopkins U., Baltimore, Md.
PATHWAYS OF METABOLISM IN EMBRYONIC DEVELOPMENT, by Clement L. Markert. Progress rept. June 58-Dec 61, on Contract AT(30-1)-2194. 26 Dec 61, 10p.

NASA N62-11554 $3.60

Resources Research, Inc., Washington, D. C.
RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE, by Gilbert V. Levin, Harold G. Hedrick and others. Quarterly progress rept. no. 1 on NASA Contract NASr-10. 15 May 61 [28]p. 1 ref.

WRU-301 $1.60

Western Reserve U. School of Medicine, Cleveland, Ohio.
INTERMEDIARY METABOLISM OF CARBOHYDRATES AND RELATED SUBSTANCES, by D. B. Keech, D. L. Wilson, and others. Progress rept. on Contract AT(30-1)-1050. 12 Sep 61, 20p.

TID-14283 $1.10

Wisconsin U., Madison.
STUDIES ON INTEGRATED ENZYME ACTIVITY IN ANIMAL TISSUES, by David E. Green. Progress rept. no. 12, 1 Nov 60-31 Oct 61, on Contract AT(11-1)-64. 30 Nov 61, 7p. 21 refs.

Radiobiology

PB 160 478 $1.60

Army Medical Research Lab., Fort Knox, Ky.
CESIUM-137 RETENTION AND DISTRIBUTION IN X-IRRADIATED RATS, by J. G. Kereiakes, D. D. Ulmer, and others. 4 Sep 61, 17p. 12 refs. Rept. no. 504.

DESCRIPTORS: *Radiobiology, Rats, Ionization, Radiation effects, X-rays, *Cesium, *Radioactive isotopes, *Metabolism.

The influence of external ionizing radiation on the retention and distribution of cesium-137 was studied. Immediately following a total-body exposure of 300, 600, or 900 r of 250 kv X-rays, rats were injected with 1 μc cesium-137. Rats given cesium-137 only served as controls. The X-irradiated rats excreted more cesium-137 over the three-day period following the irradiation than the controls, primarily accounted for by increasing urine excretion, 900 r X-irradiated rats injected with 5 μc cesium, sacrificed at 24 hours, retained less cesium in muscle, bone, blood, small intestine, and spleen but more in stomach and liver than the controls. Possible mechanisms are discussed. (Author)

UCLA-500 $1.60

California U., Los Angeles. School of Medicine.
BIOLOGICAL AVAILABILITY OF Sr^{90} TO SMALL NATIVE ANIMALS IN FALLOUT PATTERNS FROM THE NEVADA TEST SITE, by J. W. Neel and K. H. Larson. Rept. on Contract AT(04-1)-GEN-12. Dec 61, 19p.

UCLA-501 $2.60

California U., Los Angeles. School of Medicine.
PLUTONIUM, ITS BIOLOGY AND ENVIRONMENTAL PERSISTENCE, by J. H. Olafson and K. H. Larson. Rept. on Contract AT(04-1)-GEN-12. Dec 61, 27p. 56 refs.

TID-14567 $3.60

Connecticut U., Storrs.
COMPARATIVE STUDIES OF THE EFFECT OF X-IRRADIATION ON PROTOZOA AND MAMMALS. Progress rept. 1 Mar-1 Dec 61 on Contract AT (30-1)-2337. 33p. 39 refs.

TID-15410 $1.60

Johns Hopkins U., Baltimore, Md.
THE EFFECTS OF IONIZING RADIATIONS ON GENE AND CHROMOSOME MUTATION RATES IN NORMAL HUMAN CELLS IN TISSUE CULTURE, by H. Bentley Glass. Rept. on Contract AT (30-1)-1939. 23 Mar 62, 15p. 10 refs.

TID-14858 $9.10

Kansas U., Lawrence.
THE INFLUENCE OF HYDROXYCARBOXYLIC ACIDS ON THE DEPOSITION AND EXCRETION OF HAFNIUM 181 IN RATS WHEN INJECTED SUBCUTANEOUSLY, by Roger D. Tippetts. Master's thesis. May 60, 108p. 29 refs.

TID-14857 $3.60

Kansas U., Lawrence.
THE RELATIONSHIP BETWEEN X-RAY DOSE AND TWO-HIT ABERRATIONS AS SCORED AT METAPHASE AND ANAPHASE OF MITOSIS, by James H. Clark. Master's thesis, Jan 59, 34p. 17 refs.

PB 160 506 $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
RESEARCH ON THE THERMAL CONDUCTIVITY AND DIATHERMANCY OF ALBINO RAT SKIN, by Guy P. deLhery, Willard L. Derksen, and Thomas I. Monahan. Final rept. 29 Apr 59, 17p. 8 refs. AFSWP-1144; Lab. Project 5046-16, part 4; AD-220 576.

DESCRIPTORS: *Skin, Physical properties, *Flash burns, Countermeasures, Radiation effects, Thermal conductivity, Rats, Thermal radiation

In its study of protection against the thermal radiation from nuclear weapons the Naval Material Laboratory has exposed uncovered and covered rat skin to pulsed radiant energy from a carbon-arc thermal radiation source. Some thermal and optical properties of the rat skin employed in these studies have been determined by measuring the temperature of the surface of rat skin during exposure to thermal radiation. A kpc product of $10.6 \pm 0.6 \times 10^{-4}$ cgs units for the denuded blackened skin of anesthetized rat skin was determined for square wave exposures ranging from 1 to 10 seconds in duration. A systemic reaction, probably vasodilation, caused a marked increase in the kpc product for exposures longer than 10 seconds. In prior investigations at NML the kpc product for human skin was measured to be 8.6×10^{-4} cg cgs units. The effective extinction coefficient was found to change from 26 to 6.7 cm^{-1} for 1 to 20 second exposures to carbon-arc radiation and from 32 to 12 cm^{-1} for 1 to 15 second exposures to tungsten lamp radiation. Comparison of the effective extinction coefficients for both media shows that human skin is more opaque than that of the anesthetized rat. (Author)

TID-14774 $1.60

Minnesota Museum of Natural History, Minneapolis.
RADIATION AND OTHER FACTORS INFLUENCING THE DISTRIBUTION OF ANIMALS, by J. Breckenridge and John R. Tester. Progress rept. Feb 61-Jan 62, on Contract AT(11-1)-899. Jan 62, 18p.

TID-14829 $1.10

Minnesota U., St. Paul.
THE GENETIC BASIS AND PRACTICAL SIGNIFICANCE OF MUTATIONS INDUCED IN OATS AND BARLEY WITH IONIZING RADIATIONS, by David T. North. Rept. on Contract AT(11-1)-332. 8p.

TID-14866 $9.10

Rochester U., N. Y.
THE EFFECTS OF HIGH OXYGEN TENSIONS ON POTASSIUM RETENTIVITY AND SURVIVAL OF BAKER'S YEAST, by Bruce Owen Stuart. Master's Thesis. 1959, 105p. 41 refs.

UR-605 $3.50

Rochester U. School of Medicine and Dentistry, N. Y.
THORIUM INHALATION STUDIES, by Bruce B. Boecker. Rept. on Contract W-7401-eng-49. 29 Apr 62, 278p. 104 refs.

TID-14999 $1.60

Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
ATTEMPTS TO DELINEATE INBORN ANEMIAS IN MICE, by Elizabeth S. Russell and Seldon E. Bernstein. Progress rept. 1 Feb 61-31 Jan 62, on Contract AT(30-1)-1800. 31 Jan 62. 18p.

CHEMISTRY

NASA N62-11778 $1.60

National Bureau of Standards, Washington, D. C.
PHOTOLYSIS OF POLYMERS, by B. G. Archhammer. Technical rept. for 1 Dec 60-31 May 61. 14 June 61, 12p. NBS Rept. 7171; NASA Order R-5.

Analytical Chemistry

TID-14741 $1.60

National Lead Co. of Ohio, Cincinnati.
A SIMPLIFIED AUTOMATIC PHOTOMETRIC TITRATOR APPLIED TO THE TITRATION OF MICROGRAM AMOUNTS OF SULFATE, by William G. Ellis and Ernest A. Brown. 29 Jan 62 17p. 5 refs.

Y-B92-125 $4 60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
COMPARISON OF ENRICHED URANIUM URINALYSIS PROCEDURES. Rept. on Contract W-7405-eng-26. 11 Dec 59, 45p. 21 refs.

Physical Chemistry

TID-15397 $4.60

Anderson Physical Lab., Champaign, Ill.
PROGRESS REPT. on Contract AT(11-1)-544. Feb 62, 48p.

NAA-SR-6267 $1.75

Atomics International, Canoga Park, Calif.
HYDROGEN PERMEATION OF OXIDE FILMS ON ZIRCONIUM, by Tennyson Smith. Rept. on Contract AT(11-1)-Gen-8. 15 May 62, 70p. 22 refs.

WAPD-T-1294 $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
THE NATURE OF NONSTOICHIOMETRY IN URANIA-BASE SOLID SOLUTIONS, by S. Aronson and J. Belle. Rept. on Contract AT(11-1)-GEN-14. Mar 61, 24p. 11 refs.

TID-15227 $8.60

Fordham U., New York.
THE THERMODYNAMICS AND KINETICS OF COORDINATION COMPOUNDS (I). THE CHEMISTRY OF URANIUM SALTS IN SOLUTION (II) by Michael Cefola and Philip S. Gentile. Progress rept. on Contract AT(30-1)-906. 1 Mar 62, 98p. 64 refs.

PB 159 843 $9.10

Iowa [State] U., Iowa City.
ADSORPTION TECHNIQUES: SURVEY OF VAPOR-SOLID METHODS AND GUIDE FOR PROCEDURES, by Carl T. Egger (Doctoral thesis) and Karl Kammermeyer. Feb 62, 110p. 207 refs.

DESCRIPTORS: *Adsorption, Measurement, Vapors, Solids, Gravimetric analysis, Volumetric analysis, Pressure, Volume, Correlation techniques, Surface area, Porosity, Thermodynamics, Adsorbents, Bibliography, Instruction manuals.

A concise summary of adsorption measurement methods, covering the modern dynamic methods as well as the classical static methods, does not appear to be available. For this reason, an outline and introduction for the unfamiliar and a guide and summary for the advanced worker are presented. Experimental aspects are emphasized, but definitions and numerous references are included for completeness. Constant reference is made to complementary and supplementary Russian work. (Author)

PB 160 508 $1.10

James Forrestal Research Center, Princeton, N. J.
COMBUSTION WAVE STABILITY AND FLAMMABILITY LIMITS, by J. B. Rosen. Technical rept. no. 10 on Chemical Kinetics Project, Contract AF 33(038)23976. Jan 54, 9p. 3 refs. AFOSR-TN-54-35; AD-27 850.

DESCRIPTORS: *Combustion, Flames, Stability, *Flame propagation, Mathematical analysis, Energy, Potential theory, Functions, Integral equations, Differential equations, Kinetic theory.

A method is presented which is also used in determining the region of stability in the parameter space of a flame-propagating medium with simple kinetics. The method involves a simplified stability condition in which only the linearized 1-dimensional energy equation is considered along with just those terms involving the temperature perturbation τ. The resulting eigenvalue problem is transformed so as to be formally equivalent to the 1-dimensional Schrodinger equation for a particle in a potential field. The results of the consequent analysis suggest that the stability limit has its physical counterpart in the flammability limit, outside of which a steady combustion wave no longer propagates.

PB 160 507 $2.60

James Forrestal Research Center, Princeton U., N. J.
KINETICS OF THE OXIDATION OF CYCLOHEXANE WITH DINITROGEN PENTOXIDE, by J. C. D. Brand. Technical rept. no. 8 on Chemical Kinetics Project, Contract AF 33(038)23976. Jan 54, 25p. 18 refs. AFOSR-TN-54-19.

DESCRIPTORS: *Cyclohexanes, Hexanes, *Oxidation, Reaction kinetics, *Nitrogen compounds, *Oxides, Chemical reactions, Carbon tetrachloride, Organic solvents, Infrared spectroscopy.

The kinetics of the oxidation have been measured in carbon tetrachloride solution at 0^{o} and 20^{o}. The results are interpreted by a mechanism in which the hydrocarbon oxidation is initiated by attack of an NO_3 radical generated by dissociation of the dinitrogen pentoxide

$$C_6H_{12} + NO_3 = C_6H_{11}^{-} + HONO_2. \quad A$$

result of more than scientific interest arises from the observation that the initial rate of reaction at 20^{o} C is independent of the presence of nitric acid between 0 and 0.3 mole/liter. Subject to uncertainty in regard to the thermodynamic parameters for the dissociation equilibrium of dinitrogen pentoxide in carbon tetrachloride, the velocity coefficient for the primary step (a) is evaluated as $10^{10} \exp(-10,000/RT)$.

PB 160 509 $2.60

James Forrestal Research Center, Princeton U., N. J.
KINETICS OF THE THERMAL DECOMPOSITION OF AMMONIUM NITRATE, by T. M. Cawthon and Hugh Taylor. Technical note no. 17 on Chemical Kinetics Project, Contract AF 33(038)23976. Nov 54, 28p. 17 refs. AFOSR-TN-54-334; AD-50 205.

DESCRIPTORS: *Ammonium radicals, *Nitrates, *Pyrolysis, Reaction kinetics, Decomposition, Thermochemistry, Chemistry.

The rate of thermal decomposition of ammonium nitrate has been determined as a function of temperature and the amount of ammonium nitrate decomposing. These data are expressed by the equation: $-dN_2O/dt = k\,[NH_4NO_2]$ in which $k = 5.62 \times 10^{12} \exp(-39900/RT)$ sec.$^{-1}$. Kinetics of the decomposition reaction, determined by the dependence of the decomposition rate on the concentration of ammonium nitrate in mixed nitrate melts, are consistent with a mechanism which involves as the rate controlling step, reaction of ammonia with hydrated nitronium ion to give nitramide. According to this mechanism, the energy of activation for the thermal decomposition of ammonium nitrate is due largely to the endothermicity of the reaction:

$$NH_4^{+} + NO_3^{-} = NH_3 + HNO_3. \text{ (Author)}$$

PB 160 510 $5.60

James Forrestal Research Center, Princeton, U., N. J.
THE THERMAL DECOMPOSITION OF ALIPHATIC AMINE NITRATES, by. T. M. Cawthon and Hugh Taylor Technical note no. 18 on Chemical Kinetics Project, Contract AF 33(038)23976. Dec 54, 56p. 14 refs. AFOSR-TN-54-365.

DESCRIPTORS: *Amines, *Methyl radicals, *Ammonium radicals, *Nitrates, *Pyrolysis, Reaction kinetics, Decomposition, Temperature, Differential equations.

The rate of methyl ammonium nitrate decomposition is proportional to the amount of methyl ammonium nitrate decomposing, and initial first order rate constants for the formation of nitrogen are expressed by the Arrhenius equation:

$$k = 1.45 \times 10^{9} \exp(-30,000/RT) \text{ sec}^{-1}.$$

A mechanism for the decomposition of methyl ammonium nitrate is proposed. A mechanism analogous to the methyl ammonium nitrate mechanism is proposed for the thermal decomposition of tertiary butyl ammonium nitrate. A general mechanism which is consistent with the decomposition kinetics and observed volatile products from methyl ammonium nitrate, tertiary butyl ammonium nitrate, iso butyl ammonium nitrate, trifluoro ethyl ammonium nitrate and dimethyl ammonium nitrate, is proposed for the thermal decomposition of primary aliphatic amine nitrates.

NASA N62-11764 $1.60

MSA Research Corp., Callery, Pa.
ELECTROLYTIC PRODUCTION OF OXYGEN AND REDUCTION OF CARBON DIOXIDE, by R. E. Shearer, J. C. King, and C. A. Palladino. Quarterly status rept. no. 1, 11 Sep-31 Dec 61, on NASA Contract NASr-70. 12 Jan 62, 20p. 4 refs. MSAR-62-01.

TID-14959 $1.60

Lehigh U., Bethlehem, Pa.
STUDIES IN VACUUM ULTRAVIOLET PHOTOCHEMISTRY, by James E. Sturm. Annual progress rept. on Contract AT(30-1)-2772. 14 Feb 62, 18p.

NASA N62-11559 $1.60

MSA Research Corp., Callery, Pa.
ELECTROLYTIC PRODUCTION OF OXYGEN AND REDUCTION OF CARBON DIOXIDE, by C. A. Palladino, R. E. Shearer, and J. C. King. Quarterly status rept. no. 2, 1 Jan-31 Mar 62, on NASA Contract NASr-70. 24 Apr 62, 10p. 2 refs. MSAR-62-36.

TID-14808 $1.60

Pennsylvania State U., University Park.
THE EFFECT OF TEMPERATURE ON SOME RARE EARTH SESQUIOXIDE THORIUM DIOXIDE SYSTEMS, by Karl A. Gingerich. Rept. on Contract AT(30-1)-2541. 15 May 62, 7p. 10 refs.

TID-14769 $6.60

Pittsburgh U., Pa.
CALORIMETRIC, STRUCTURAL AND MAGNETIC STUDIES OF METALS AND INTERMETALLIC COMPOUNDS, by R. S. Craig. Annual rept. 1 Feb 61-1 Feb 62, on Contract AT(30-1)-2163. 1 Feb 62, 73p. 39 refs.

CNLM-2154 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
DIFFUSION OF XENON IN COLUMBIUM, by D. P. Gregory and H. W. Leavenworth. 25 Nov 59, declassified 9 May 61. 2p. 4 refs.

NYO-10183 $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
EXTRACTION OF INORGANIC SUBSTANCES BY ORGANIC SOLVENTS, by H. M. Clark. Final rept. on Contract AT(30-1)-1663. 19 Mar 62, 13p.

NASA N62-11058 $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
OXYGEN RECOVERY BY THE CATALYTIC DISSOCIATION OF CARBON DIOXIDE, by J. J. Konikoff. Rept. on NASA Contract NASr-95. 1962, 13p. 4 refs.

Presented at 33rd annual meeting, Aerospace Med. Assn., Atlantic City, N. J., Apr 9-12, 1962.

NASA N62-10993 $1.60

Warner and Swasey Co., New York.
METHODS FOR INFRARED ANALYSIS OF ROCKET FLAMES IN SITU, by Gunther J. Penzias and Richard H. Tourin. [1962] 16p. 9 refs.

EARTH SCIENCES

PB 160 457 $12.00

Armour Research Foundation, Chicago, Ill.
RESEARCH STUDIES OF STRESS WAVES IN EARTH AND MODEL EARTH MEDIA, by A. J. Durelli and William F. Riley. Final rept. on Contract AF 29(601)1167. Oct 59, 167p. 16 refs. ARF Proj. no. K148; AFSWC-TR-60-4; AD-237 255.

DESCRIPTORS: *Earth models, *Soils, *Sheets, *Stresses, Distribution, Photographic analysis, Pressure gages, Load distribution, Tests.

A solution to the problem of the stress distribution on the boundary of a circular hole in a large plate is considered during passage of a stress wave of long duration. The solution is experimentally obtained by using a low modulus model material in a combined photoelasticity and grid analysis. Results indicate that a biaxial state of stress exists, such that the maximum tensile stress, produced in the free field, is about 0.45 times the maximum compressive stress. A solution of the stress distribution on the plate is also considered during passage of a stress wave of short duration. Results indicate that the stress of greatest magnitude which developed on the hole boundary is a compressive stress. An attempt was made to obtain the stress distribution on the boundary of an embedded rigid obstruction in a large plate during passage of compressive stress waves. The results indicate that the maximum shearing stresses can be obtained from the photoelasticity data with sufficient accuracy. Barium titanate gages embedded in cylinders of clay and of urethane rubber were subjected to dynamic loadings while diaphragm gages, embedded in urethane rubber cylinders, were subjected to static and dynamic loadings. The embedded barium titanate gage response was in all instances about 40% greater than the response for an air shock loading.

PNE-130P $1.25

Geological Survey, Washington, D. C.
HYDROLOGIC AND GEOLOGIC STUDIES FOR PROJECT GNOME. Plowshare Program. Project GNOME. Preliminary rept. May 62, 53p. 34 refs.

Climatology and Meteorology

PB 160 474 $21.00

Air Force Cambridge Research Labs., Bedford, Mass.
HOURLY RAWINSONDES FOR A WEEK, by Arnold Court and Henry A. Salmela. July 61, 358p. GRD Research notes no. 60; AFCRL-638.

DESCRIPTORS: *Atmospheric sounding, *Meteorological data, Temperature, Pressure, Wind, Tables.

Results of 161 GMD-1 rawinsonde flights made at 1-hour intervals during the first seven days of April 1960, at Bedford, Mass., are presented in detail. Wind displacements over intervals of 1, 2, 3, and 4 minutes are given separately for the west-east and south-north components. Heights and temperatures are presented for standard pressure surfaces every 50 mb to 200 mb and at closer intervals at higher levels. (Author)

AD-271 008 $9.10

Marine Lab., U. of Miami, Coral Gables, Fla.
WEATHER RADAR RECEIVING SYSTEM, by P. R. Ray, H. W. Hiser, and C. E. Steen. Final rept. Part I, 15 Oct 59-15 Oct 61, on Contract NOas 60-6026-C. Nov 61, 102p. 11 refs. 8824-4; ML 61394.

DESCRIPTORS: *Meteorological radar, *Radar receivers, Display systems, Radar equipment, *Height finding, Attenuation, Effectiveness, Tests, Precipitation, Hurricanes, Radar echo areas, Range finding, Intensity, Measurement.

A new radar receiver system specially designed for meteorological applications is described. The system features, their functions and capabilities, and their present and proposed future utility are presented. This receiver system has many flexible features and provides good quantitative, range corrected information regarding the character and intensity of precipitation echoes. Details are given for a video distribution system which makes use of transistorized amplifiers and can serve up to ten display and readout units from two or more input radars. Statistical results of a precipitation echo height study based upon two years of data from an MPS-4 height-finder radar are presented and the application of this echo height information to the range attenuation correction problem is discussed. Radar observations of hurricane Donna, 1960 are discussed including comparisons of the capabilities of the WSR-57, SP-1M and MPS-4 radars at Miami and an evaluation of precipitation echo heights within the storm as observed with the MPS-4 height-finder radar. (Author)

Geodesy

PB 159 972 $9.10

Pacific Scientific Information Center, Honolulu, Hawaii.
AIR PHOTOGRAPHS OF PACIFIC ISLANDS FILED IN BISHOP MUSEUM, by E. H. Bryan, Jr. Rept. on National Science Foundation Grant N.S.F.G. 11550 and Office of Naval Research Grant ONR-Nour (6) 0005-61. [1961] 105p.

DESCRIPTORS: *Aerial photographs, *Pacific Islands, Museums, Geography.

A guide to, and catalog of, nearly 65,000 air photographs, representing more than 2,000 air sorties.

PB 160 460 $8.60

Rosenberg, Paul, Associates, Mount Vernon, N. Y.
AUTOMATIC MAP COMPILATION SYSTEM: EXPERIMENTAL STUDY OF PROFILES AND MATCH ERROR CURVES, by Ross E. Williams and Paul Rosenberg. Final rept. 10 Dec 56-31 Jan 58, on Contract DA 44-009-eng-3154, [Apr 58] 96 p. AD-219 264.

DESCRIPTORS: *Automatic, *Mapping, Instrumentation Aerial photography, Photography, *Aerial photographs, Photographic film, Processing, Electronic equipment, Electronic scanners, Optical systems, Photomultipliers, Operation, Errors, Terrain, Experimental data.

Profiles and match error curves of the automatic map compilation system for aerial negatives were investigated with experimental laboratory equipment. The experiments performed demonstrate that the automatic map compilation system can track profiles electronically through difficult terrain on aerial diapositive plates. Good resolution and sensitivity are obtained in electronic scanning and matching. The experimental laboratory equipment used in this study gives a C factor of 650. The system should eventually give C factors considerably greater than 1000. (Author)

Geology

RME-4523 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE AYACUCHO BASIN, DEPARTMENTS OF HUANCAVELICA AND AYACUCHO, PERU, by Justin B. Moses. July 57, 8p. Prepared in cooperation with Junta de Control de Energia Atomica, Lima (Peru).

RME-4516 $0.50

Atomic Energy Commission. Division of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE PROVINCES OF AYABACA AND HUANCABAMBA, DEPARTMENT OF PIURA, PERU, by Lawrence J. Brown and Guillermo Morales S. Sep 57, 11p. Prepared in cooperation with Junta de Control de Energia Atomica, Lima (Peru). 1 ref.

RME-4564 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE RIO TAMBO AREA, PROVINCE OF ISLAY, DEPARTMENT OF AREQUIPA, PERU, by Justin B. Moses and Francisco Cutolo L. Feb 58, 10p. Prepared in cooperation with Junta de Control de Energia Atomica, Lima (Peru).

UCRL-13036 $7.60

Colorado School of Mines Research Foundation, Inc., Golden
SOURCES OF INFORMATION ON ROCK PHYSICS, by Lorraine Burgin. Technical rept. 28 Feb 62, 75p.

TEI-803 $5.60

Geological Survey, Washington, D. C.
GROUND WATER TEST WELL D, NEVADA TEST SITE, NYE COUNTY, NEVADA, by William Thordarson, Murray S. Garber, and George E. Walker. Feb 62, 60p. 4 refs.

Physics of the Atmosphere

PB 160 475 $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE FORMATION OF IONS IN THE UPPER ATMOSPHERE, by Robert E. Huffman. Nov 61, 38p. 36 refs. GRD Research notes no. 66; AFCRL-851.

DESCRIPTORS: *Upper atmosphere, *Ions, Ion sources, Ionospheric propagation, Chemical reactions, Ionosphere, Electrons, Ultraviolet radiation.

The present state of knowledge concerning the formation of positive and negative ions in the earth's normal ionosphere is reviewed. The main process by which positive ions and electrons are formed in the ionosphere is photoionization of neutral constituents by solar vacuum ultraviolet radiation. Negative ions are formed primarily by direct attachment of electrons to certain neutral constituents. Existing values of the cross sections and rate coefficients of these processes are presented and gaps in the present knowledge are discussed. (Author)

PB 154 486 $1.60

Electronic Defense Lab., Mountain View, Calif.
AN INVESTIGATION OF THE LUNAR ECHO METHOD OF DETERMINING ELECTRON COUNT OF THE ATMOSPHERE, by Harold L. Newman. Rept. on Contract DA 36-039-sc-78281. 13 Nov 59, 18p. 4 refs. Technical memo. no. EDL-M234; AD-233 393.

DESCRIPTORS: *Atmosphere, *Radio signals, *Moon, Reflection, Electrons, Density, *Magnetic fields, Electron counters.

The technique of determining the electron content of the ionosphere by measurement of Faraday rotation of 120-mc lunar echoes is examined to determine the limits of applicability of this method. It is shown by numerical integration that, provided all the electrons are located within a few hundred kilometers of the F2 layer maximum, the method yields useful and essentially unambiguous results. However, it is incapable of detecting the possibly very large number of electrons which are believed to exist at low concentrations (of the order of 1000/cc) in the upper reaches of the earth's atmosphere. Since this number might be greater by a factor of several times that predicted by the method it is concluded that the values of electron count obtained by the Faraday rotation technique are necessarily minimum values, and that other methods must be used to determine the electron count in regions where both the electron density and the earth's magnetic field are highly tenuous. (Author)

PB 160 461 $8.10

Instrument Engineering Research, Cambridge, Mass.
TURBULENCE MEASUREMENTS AT HIGH ALTITUDES, by Sidney Lees. Final rept. 1 July 58-30 Sep 59, on Contract DA 36-039-sc-78129. [1959] 89p. 1 ref. AD-232 915.

DESCRIPTORS: *Atmosphere, Turbulence, Measurement, *Wind, Stresses, *Radar reflections, Mathematical analysis, *Meteorological radar, Tests.

Measurement of separation vector between two targets resolved in Cartesian coordinates by interferometric techniques employing zero crossings at each station in a ground array. Development of theory and description of preliminary experiments demonstrating existence of physical basis for concepts. For two target system turbulence is expressed in form of velocity variation matrix from time history of separation vector. Limits of method are discussed and evaluated Techniques for overcoming the limitations are described. Extension of theory to multiple targets like chaff shows that velocity variation matrix is not best concept for such systems. Further application of statistical process theory is necessary to sharpen the interpretation. (Author)

PB 161 647 $0.75

National Bureau of Standards, Boulder, Colo.
ANALYSIS OF IONOSPHERIC VERTICAL SOUNDINGS FOR ELECTRON DENSITY PROFILE DATA. III. PROCEDURES FOR OBTAINING MONTHLY SUMMARY VIRTUAL HEIGHT CURVES FOR N(h) ANALYSIS (COMPOSITE VIRTUAL HEIGHT CURVES), by J. W. Wright. 1 May 62, 23p. 5 refs. Technical note no. 146.

DESCRIPTORS: *Electrons, Density, Determination, *Ionosphere, *Atmospheric sounding, Data, Analysis.

Procedures are described for use at ionospheric sounding stations for obtaining a median virtual height curve from a number of individual ionospheric vertical soundings. This median curve may then be analyzed to find an electron density profile representative of the individual observations. The method is advocated as an economical way to obtain a world N(h) morphology and to obtain control data for studies using more detailed and accurate profiles. (Author)

NASA N62-11750 $5.60
Also available as AD-262 182 $6.60

Space Physics Research Lab., U. of Michigan, Ann Arbor.
MEASUREMENTS OF ATMOSPHERIC PRESSURE, TEMPERATURE, AND DENSITY AT VERY HIGH ALTITUDES, by A. F. Nagy, N. W. Spencer and others. Final scientific rept. on NASA Contract NASw-175, Contracts DA 20-018-509-ORD-103 and DA 36-039-sc-78131. Aug 61, 57p. 17 refs. ORA Proj. 02804, 04004, and 04141.

Seismology

RM-2798-AEC $2.60

Rand Corp., Santa Monica, Calif.
THE STRENGTH OF UNDERGROUND CAVITIES OF SPHERICAL AND SPHEROIDAL GEOMETRY, by J. M. Green. Rept. on Contract AT (11-1)-135. Oct 61, 28p. 6 refs.

NASA N62-11537 $1.60

Seismological Lab., Calif. Inst. of Tech., Pasadena.
REPORT OF PROGRESS, JUNE 16-DEC. 16, 1961, by F. E. Lehner. Rept. on NASA Contract NASw-81. 20 Dec 61, [9]p.

ENGINEERING

NASA N62-11126 $8.10
Also available as AD-274 124

Guggenheim Labs. for the Aerospace Propulsion Sciences, Princeton U., N. J.
TRANSIENT PRESSURE MEASURING METHODS: TRANSIENT PRESSURE TRANSDUCER DESIGN AND EVALUATION, by Howland B. Jones, Jr. Rept. on NASA Contract NASr-36. Feb 62 [81]p. 14 refs. Aeronautical Engineering rept. 595b.

NASA N62-11727 $18.50

National Engineering Science Co., Pasadena, Calif.
THRUST VECTOR CONTROL SYSTEM UTILIZING AN ADVERSE PRESSURE GRADIENT IN THE NOZZLE, by Shigemi Hozaki, R. L. Chapkis and others. Final rept. on NASA Contract NASw-249. Apr 62, 299p. 22 refs. SN/60.

SCTM-138-61(14) $1.10

Sandia Corp., Albuquerque, N. Mex.
A BAKABLE DIFFUSION PUMP ASSEMBLY FOR ULTRA HIGH VACUUM, by G. L. Krieger and G. D. Cosgrove. May 61, 8p.

PB 160 503 $6.60

Coast Guard, Washington, D. C.
CHANGES IN COAST GUARD DESIGN. 14 Jan 57, 61p. Civil Engineering rept. CG-250-25; AD-225 678.
DESCRIPTORS: *Buoys, Design, Coast Guard research, Radar.

This paper was presented at the 1955 International Lighthouse Conference for the purpose of reporting the developments in buoy design during the past five years by the U. S. Coast Guard. The evolution of the radar type, all welded, electric lighted buoy as the standard type buoy is the result of extensive radar field tests, experience with electricity as the illuminant, and the perfection of electric welding equipment. Except for early experimental work, electric buoys were first used as standard equipment in 1935. All lighted buoys manufactured since 1950 have been electric. Redesign of unlighted buoys was undertaken in an effort to minimize buoy inventory by decreasing the number of types of buoys, and specifically to provide a better radar type buoy. The functions of the unlighted buoys are: (1) To serve as a floating daymark, (2) To serve as a radar target, and (3) to serve as a floating channel marker at night. The new unlighted buoys satisfy the requirements set forth without much increase in cost over the older types of buoys which provide poor radar response. The usefulness of these buoys at night is improved by applying retroreflective material to the buoy. (Author)

TID-15351 $1.60

Heat Transfer Lab., U. of Minnesota, Minneapolis.
RESEARCH ON HEAT TRANSFER TO FLUIDS FLOWING THROUGH NON-CIRCULAR CHANNELS, by E. R. G. Eckert and J. L. Novothy. Progress rept. on Contract AT(11-1)-659. Mar 62, 16p. 2 refs.

Aeronautical Engineering

NASA N62-11108 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ANALYTICAL INVESTIGATION OF THE SPIN AND RECOVERY CHARACTERISTICS OF A SUPERSONIC TRAINER AIRPLANE HAVING A 24° SWEPT WING, by William D. Grantham. Apr 62, 39p. 4 refs. NASA TM-X-606.

NASA N62-11441 $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station Va.
EXPERIMENTAL RESEARCH ON 4-DUCT TANDEM VTOL AIRCRAFT CONFIGURATIONS, by M. O. McKinney and W. A. Newsom. 3-5 May 62 [16]p.

Presented to 18th Annual Forum of Amer. Helicopter Society.

AD-275 515 repriced $3.00

Systems Technology, Inc. [Inglewood, Calif.]
PERFORMANCE CRITERIA FOR LINEAR CONSTANT-COEFFICIENT SYSTEMS WITH DETERMINISTIC INPUTS, by Julian Wolkovitch, Ray Magdaleno and others. Rept. on Contract AF 33(616)7841. Feb 62, 182p. 80 refs. Technical rept. no. ASD-TR-61-501.

DESCRIPTORS: *Flight instruments, *Control systems, Linear systems, Tests, Errors, Time lag theory, Feedback, Functions, Sensitivity, Dynamics, Numerical analysis.

Performance measures and associated criteria for linear constant coefficient systems forced by deterministic inputs are investigated, with particular reference to flight control systems. It is shown that the application of performance measures is facilitated by substituting for the actual flight control system an equivalent low-order linearized system having similar dynamic characteristics. A critical survey of current performance measures is given, and new methods for the analytic evaluation of some indicial error measures are presented. (Author)

Chemical Engineering

PB 181 299 $4.00

Food Machinery and Chemical Corp. [San Jose, Calif.]
FEASIBILITY, RESEARCH AND ANALYSIS OF HEAT EXCHANGE SYSTEMS WITHOUT METALLIC HEAT EXCHANGE SURFACES AND LABORATORY STUDY OF SINGLE STAGE VAPOR REHEAT DISTILLATION, by W. S. Thompson, Teynham Woodward and others. Rept. on Contracts 14-01-001-163, -173, -217. Apr 62, 293p. 31 refs. Saline Water Research and Development progress rept. no. 63.

DESCRIPTORS: *Sea water, Water, *Desalination, *Distilling plants, *Heat exchangers, Liquids, Feasibility studies, Economics, Hydrocarbons, Petroleum, Molecular weight, Physical properties, Solubility, Mass transfer, Heat transfer, Vapor pressure, Boilers, Towers (Chemistry), Construction, Operation, Tests.

The first phase of this feasibility study was directed towards a broad coverage of the subject: (1) current literature on mass exchange columns was partially reviewed with particular reference to free rise or fall of liquid drops in water, flooding velocities in spray columns, and heat transfer coefficients in spray columns; (2) three potential heat exchange liquids were selected for study and some preliminary tests completed; (3) calculations were made to determine the approximate size of equipment required for a sea water distillation plant to produce 10,000,000 gallons/day.

XDC-61-4-702 $2.60

General Electric Co., Cincinnati, Ohio.
LITERATURE SURVEY SAMPLING, PLATE-OUT AND CLEANING OF GAS-COOLED REACTOR EFFLUENTS, by M. N. Myers. Rept. on Contract AT(11-1)-171. 4 Apr 61, 28p. 197 refs.

PB 160 499 $2.60

Naval Research Lab., Washington, D. C.
REMOVAL OF CO_2 FROM SUBMARINE ATMOSPHERES BY AMINE RESINS. A FEASIBILITY STUDY, by W. E. McConnaughey, S. B. Crecelius, and W. N. Crofford, III. 12 Nov 57, 27p. 6 refs. NRL rept. 5022; AD-149 094.

DESCRIPTORS: *Submarines, *Ventilation, *Carbon dioxide, *Absorption, *Amines, *Resins, Air, Purification.

A number of amine resins with an excess of amine groups have been prepared and studied for their absorption and desorption of CO_2 in the gas phase. Evaluations were made of types of amines, cycled life in absorption and desorption, and the effect of swelling agents including H_2O on the efficiency of these amine resins. It was found that a swelling agent was necessary for measurable absorption to take place, with water-swelled resins showing more absorption than nonaqueous-swelled resins. A water swelled amine resin cycled 1008 times through the absorption and desorption of CO_2 from air containing 1-1/2 percent CO_2 showed no decrease in absorption efficiency on a volume basis, but there was a noticeable loss of amine resin during this operation. The loss of H_2O during reactivation of the resin may cause an engineering problem which cannot be satisfactorily overcome in the practical application of these resins for CO_2 removal in submarines. (Author)

K-1428 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
THE USE OF KARBATE ANODES IN FLUORINE CELLS, by J. Dykstra and W. C. Paris. Rept. on Contract W-7405-eng-26. 11 Aug 59, 14p. 3 refs.

ORNL-TM-224 $1.60

Oak Ridge National Lab., Tenn.
HRT-CHEMICAL PLANT RUN 21 SUMMARY, by O. O. Yarbro. 12 Feb 62, 15p. 7 refs.

ORNL-TM-223 $1.60

Oak Ridge National Lab., Tenn.
TESTING OF EQUIPMENT FOR REMOVING NICKEL FROM HRT FUEL, USING UO_4 PRECIPITATION, by O. O. Yarbro. 12 Feb 62, 11p. 1 ref.

TID-14825 $1.60

Ohio State U. Research Foundation, Columbus.
FLUID SOLID HEAT TRANSFER STUDY, by Robert S. Brodkey, Progress rept. on Contract AT(11-1)-774. Dec 61, 15p. 3 refs. OSURF rept. 929-2.

IDO-14574 $1.25

Phillips Petroleum Co., Idaho Falls.
CHEMICAL PROCESSING TECHNOLOGY, ed.by J. R. Bower. Quarterly progress rept July-Sept 61, on Contract AT(10-1)-205 18 Dec 61, 54p 14 refs.

Electrical and Electronic Engineering

PB 160 452 $5.60

Armour Research Foundation, Chicago, Ill.
DESIGN AND DEVELOPMENT OF MINIATURE RF CABLES AND CONNECTORS, by E. S. Oxner. Quarterly rept. no. 1, 1 Aug-31 Oct 58, on Contract DA 36-039-sc-74956. Nov 58, 59p. 7 refs. ARF Proj. no. E 096; AD-218 520.

DESCRIPTORS: Radiofrequency, *Coaxial cables, *Electric connectors, *Radiofrequency cables, *Miniature electrical equipment, Design, Broadband, Transmission lines.

A discussion of the design concepts for a broadband transition from a type N to subminiature cable is presented. A broadband coaxial transition to adapt coaxial cable. RG58C/U and RG141/U, to standard measuring equipment was developed and found to perform over a bandwidth from 100 to 7000 Mc with a VSWR less than 1.11 to 1.0. Terminations were investigated and 2 tentative designs are ready for evaluation. Both should have broadband characteristics with VSWR less than 1.10 to 1.0, or better. Several miniature RF coaxial connectors for use with cables of the 0.200 diameter class were tested electrically from 50 to 5000 Mc. Experimental results are given. (Author)

PB 160 453 $3.60

Armour Research Foundation, Chicago, Ill.
DESIGN AND DEVELOPMENT OF MINIATURE RF CABLES AND CONNECTORS, by R. M. Janowiak. Quarterly progress rept. no. 2, 1 Nov 58-31 Jan 59, on Contract DA 36-039-sc-74956. [1959] 35p. ARF Proj. no. E 096; AD-227 210.

DESCRIPTORS: Radiofrequency, *Coaxial cables, *Electric connectors, *Radiofrequency cables, *Miniature electrical equipment, Design, Broadband, Transmission lines.

The coaxial termination was tested to determine its VSWR characteristics. The results of this test yield a VSWR under 1.13 over the entire frequency range of 1500 to 7500 mc. These results enables the initiation of large scale VSWR testing of connector pairs associated with RG-58C/U coaxial cable. The test procedure and equipment complement is discussed in detail. The original transition has been modified to prevent movement of its center conductor during the VSWR tests. This movement was found to adversely affect the VSWR measurements due to the many cable insertions made on the transition. To overcome this difficulty, a captivated-pin type N connector, UG-1185/U, was used to replace the original UG21D/U connector. The VSWR data for this transition is less than 1.10 over the entire frequency range of 1500 to 7000 mc. This transition now being utilized in the VSWR testing program. The general test procedure is described and a flow diagram of a connector set through the various tests is included. (Author)
(See also PB 160 452)

PB 160 020 $1.60

[Bell Telephone Labs., Inc., Whippany, N. J.]
A METHOD OF CONNECTING ENCAPSULATED PRINTED CIRCUITS TO CONSUME A MINIMUM OF VOLUME, by G. E. Penisten. 5 Aug 54, 14p. Case 27675.

DESCRIPTORS: *Printed circuits, Circuits, Encapsulation, *Electric connectors, Volume, Wiring diagrams.

PB 160 019 $2.60

[Bell Telephone Labs., Inc., Whippany, N. J.]
PRINTING WIRING TECHNIQUE APPLIED TO MILITARY ELECTRONICS EQUIPMENT, by N. Osifchin. 31 Aug 53, 26p. Case 26500-10; MM-53-8570-1.

DESCRIPTORS: *Military equipment, *Electronic equipment, *Printed circuits, Circuits, Wiring diagrams, Amplifiers, Video amplifiers.

PB 160 497 $12.50

Boeing Co., Seattle, Wash.
AN INVESTIGATION OF THE EFFECTS OF NUCLEAR RADIATION ON SELECTED TRANSISTORS AND DIODES, by G. L. Keister and H. V. Stewart. Preliminary rept. on Contract AF 33(038)19589. 22 Aug 56, 171p. 8 refs. Document no. D5-1183; AD-123 953.

DESCRIPTORS: *Transistors, *Diodes, *Radiation effects, Gamma rays, *Radiation damage, Neutrons, Noise (Radio), Tests.

A gamma flux of 2×10^6 r/hr induced a measurable voltage across a pn junction. Transient changes were noted in the collector characteristic due to gamma irradiation. This damage was characterized by a large increase in the leakage current which healed from seconds to minutes after removal of the flux. Sensitivity of various transistors to this effect varied by several orders of magnitude. This effect was observed for a gamma flux of 5×10^4 r/hr and of 2×10^6 r/hr. Permanent changes in the current gain of the transistors due to gamma ray and fast neutrons were observed. In general, this damage accumulated more rapidly in the thick-base transistor than in the thin-base variety. This damage was accumulated in a range of 10^{10} nvt to 10^{14} nvt for neutrons above cadmium cutoff and from 10^7 r to 10^8 r for fission product gamma rays. A considerable increase in the noise figure of transistors was observed immediately upon their exposure to gamma radiation. The increase in noise was observed to be proportional to the gamma flux. (Author)

PB 160 454 $3.60

Columbia Radiation Lab., Columbia U., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM, by P. Kusch. Quarterly progress rept. no. 6, 16 Mar-15 June 59, on Contract DA 36-039-sc-73279. 15 June 59, 37p. 4 refs. CU-6-59-SC-73279 Physics; AD-225 123.

DESCRIPTORS: *Magnetrons, *Microwave spectroscopy, Cerenkov radiation, Microwave equipment, *Molecular beams, Tritium, Atoms, Fluorine, Oxygen, Radioactive isotopes, Atomic structure, Hyperfine structure, Helium, Ions, Electromagnetic waves, Microwave amplifiers, *Masers, Design, Physics.

Work on several maser projects is reported. These include solid state masers at 3 cm and at 21 cm, a solid state maser to operate at liquid nitrogen temperatures instead of liquid helium temperatures and

an infrared maser. The application of maser techniques to radio-astronomic measurements and to high resolution spectroscopy of molecules is discussed. Studies of various materials, directed towards an elucidation of the properties of these materials for potential maser application are described. Continuing work on magnetron development and on the generation of Cerenkov radiation is reported. Experiments directed towards determining hyperfine structure measurements in various atoms are described. The results of a continuing interest in the properties of the metastable state of hydrogen are described and a new experiment is proposed to determine the lifetime of the metastable state of singly ionized helium, a hydrogenic atom. (Author) (See also PB 159 921)

NASA N62-11316 $3.60

David Sarnoff Research Center, Princeton, N. J.
RADIATION DAMAGE TO SILICON SOLAR CELLS, by M. Abrahams, J. A. Baicker, and B. W. Faughnan. Quarterly rept. no. 3, 16 Jan-15 Apr 61, on NASA Contract NAS5-457. 30 Apr 61. [33]p. 3 refs.

PB 160 458 $3.60

David Taylor Model Basin, Washington, D. C.
THE RECIPROCITY CALIBRATION OF PIEZOELECTRIC ACCELEROMETERS (WITH SUPPLEMENT), by Mark Harrison, A. O. Sykes and others. Aug 53, 33p. 6 refs. Rept. 811, rev. ed.

DESCRIPTORS: Piezoelectric crystals, *Accelerometers, Transducers, *Calibration, Theory, Experimental data.

Two piezoelectric accelerometers have been calibrated by an absolute reciprocity technique in the frequency range from 100 cps to 10 kc. A theoretical and experimental evaluation of the technique is given. Since the original publication of this report, supplemental work has been done to improve the accuracy of results and to learn reliable techniques for performing routine calibrations of piezoelectric accelerometers by the reciprocity method. (Author)

NASA N62-11146 $1.60

Electronic Communications, Inc., Timonium, Md.
DEVELOPMENT TECHNIQUES FOR SUPERHETERODYNE RECEIVER, by James C. Wiltse, Marvin Cohn and others. Monthly progress rept. no. 6 for Feb 62 and Quarterly progress rept. no. 2 for Dec 61-Feb 62, on NASA Contract NASw-259. 15 Mar 62, 17p.

NASA N62-11762 $9.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
MODULATION TRANSFER CHARACTERISTICS OF LIGHTLY DAMPED DISTRIBUTED-PARAMETER SYSTEMS, by Andre A. S. Danthine. Rept. on NASA Grant NsG-149-61. Nov 61, 116p. 7 refs. Rept. ESL-R-121; MIT Proj. DSR 8836.

NASA N62-11144 $7.60

General Electric Co., Cincinnati, Ohio.
AC ARC DYNAMICS, STABILIZATION AND STARTING CRITERIA, by W. A. Geideman and G. F. Vaughn. Quarterly progress rept. no. 2, Oct-Dec 61, on NASA Contract NAS8-2415. 25 Jan 62, 72p.

DC-58-9-34 $2.60

General Electric Co., Cincinnati, Ohio.
PULSE PREAMPLIFIER REPORT-PROJECT 102, by C. N. Jackson and J. C. Voet. Preliminary rept. on Contract AT (11-1)-171. 2 Sep 58, 27p.

PB 160 495 $3.60

General Electronic Labs., Inc., Cambridge, Mass.
WATER COOLED VERSION OF THE AN/SLQ-4 (XN-2). Interim development rept. no. 6, 1 Aug-31 Oct 60, on Contract NObsr-77546. [1960] 33p. 1 ref. E-48-6; AD-251 885.

DESCRIPTORS: *Radar jamming, *Radar equipment, Liquid cooled, Water, Shipborne, *Electronic equipment, Countermeasures, *Cooling, Heat exchangers, Heat transfer, Coolants, Temperature, Design.

The report period was spent in preparing and submitting final thermal design plans and in mechanical design of the receiver-indicator unit and transmitter units of the water-cooled version of the AN/SLQ-4(XN-2). A research program was conducted on frequency multipliers that could be used in the water-cooled version of the AN/SLQ-4(XN-2). Specifications tor the external oil-to-water heat exchanger for the water-cooled version of the AN/SLQ-4(XN-2) were drawn up and submitted to several vendors for purpose of quotation. (Author)

PB 160 477 $5.60

International Resistance Co., Philadelphia, Pa.
INVESTIGATION OF FIXED HIGH STABILITY RESISTORS, by William F. Ebling, Jr. Final rept. 15 June-15 Sep 58, on Contract DA 36-039-sc-73235. [1958] 58p.

DESCRIPTORS: *Fixed resistors, Design, Production, Resistors, Stability.

The investigation of methods and materials believed to be capable of leading to low cost, insulated, fixed resistors of high stability was continued. Improvements in processing techniques and the development of prototype equipment for mass producing resistors in quantities sufficient for process and performance reliability studies was continued. Performance testing of large sample sizes was conducted to determine compliance with the contract specifications and to disclose areas where further development is required. Extended load life and moisture resistance tests were performed as part of the Performance Reliability Study. The investigation of means for producing stable high resistance films suitable for making resistors as high as 20 megohms was continued. (Author)

TID-14767 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
THE EFFECT OF PHOTON IRRADIATION INDUCED CHANGES IN PHOTOELECTRIC EFFICIENCY ON THE OPERATION OF PHOTOMULTIPLIERS, by F. T. Gould, R. C. Rohr, and D. J. Anthony. 24-27 Jan 62, 10p. 1 ref.

PB 161 644 $1.25

National Bureau of Standards, Boulder, Colo.
NUMERICAL RESULTS FOR THE SURFACE IMPEDANCE OF A STRATIFIED CONDUCTOR, by C. M. Jackson, J. R. Wait, and L. C. Walters. 19 Mar 62, 48p. 2 refs. Technical note no. 143.

DESCRIPTORS: *Conductors, Stratification, Surfaces, *Impedance, Numerical analysis, Amplitude modulation, Phase modulation, Modulation, Functions, Tables.

Extensive numerical results are presented for the surface impedance of a horizontally stratified conducting medium. Both two- and three-layer models are considered and the results are given for both normal and oblique incidence. (Author)

NASA N62-11437 $4.60

Oklahoma State U. Research Foundation, Stillwater.
ANALYTICAL AND EXPERIMENTAL STUDY OF THE MECHANISMS OF PENETRATION AND LIGHT EMISSION FOR MICROMETEOROID IMPACT ON AN ALUMINUM-COATED PHOTOMULTIPLIER, by F. C. Todd, B. A. Sodek and others. Quarterly progress rept. no. 5, 1 Oct-31 Dec 61, on NASA Contract NASr-7. [1962] [44]p. 10 refs.

NYO-10076 $1.60

Radio Corp. of America [Harrison, N. J.]
RESEARCH AND DEVELOPMENT OF A LARGE DEMAGNIFYING IMAGE INTENSIFIER, by R. D. DesRochers. Semi-annual progress rept. July-Dec 61, on Contract AT(30-1)-2840. 15 Jan 62, 21p.

SCTM-286-61(73) $1.60

Sandia Corp., Albuquerque, N. Mex.
APPROXIMATION OF LOGARITHMIC FREQUENCY SWEEP RATE WITH LINEAR SWEEP RATE FOR USE IN VIBRATION TESTING, by J. G. McGowan. Oct 61, 20p.

SCTM-294-61(14) $1.60

Sandia Corp., Albuquerque, N. Mex.
OUTPUT $\bar{E}/\sigma_E$ VERSUS INPUT S/N IN A BINARY FREQUENCY-SHIFT RECEIVER, by Charles S. Williams. Nov 61, 15p. 2 refs.

SCTM-4-62(14) $2.60

Sandia Corp., Albuquerque, N. Mex.
POWER RATINGS OF TRANSISTORS, by Jerry A. Hood. Feb 62, 30p. 6 refs.

NASA N62-11737 $1.10

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
MAGNETOHYDRODYNAMICS AND ORBIT THEORY, by T. Gold. Semi-annual status rept. for 15 July 61-15 Jan 62, on NASA Grant NsG-184-60. 15 July 62, 5p. Rept. CRSR-103.

AD-275 427 repriced $0.50

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
COMPATIBILITY OF PROPELLANTS 113 AND 114B2 WITH AEROSPACE STRUCTURAL MATERIALS, by J. D. Jackson and W. K. Boyd. Rept. on Contract AF 33(616)7747. 27 Apr 62, 18p. 14 refs. DMIC memo. 151.

DESCRIPTORS: *Hydrocarbons, *Fluorine, Halogens, *Rocket propellants, Propellants, Guided missiles, Spaceships, Materials, Physical properties, Chemical properties, Corrosion, Hydrolysis, Heat tolerance, Toxicity, Refrigerants, Aerosols, Fire extinguishers, Plastics, Impact shock.

Considerable interest has been generated recently in the use of two fluorinated hydrocarbons (Propallants 113 and 114B2) because of their moderate boiling point and low specific heat and heat of vaporization. These compounds are being considered as propellants for vernier rockets which are used for stabilization of missiles and spacecraft. For this reason, the corrosion properties of these fluorinated hydrocarbons have been investigated with metals commonly used in missile applications. This memorandum presents the corrosion data and summarizes certain physical and chemical properties of Propellants 113 and 114B2. (Author)

NASA N62-11770 $3.60

Dunlap and Associates, Inc., Stamford, Conn.
A GENERALIZED MISSION DESCRIPTION FOR MANNED SPACE FLIGHT. Rept. on NASA Contract NASr-64. 1 Jan 62, 33p. 17 refs. Technical rept. 61.55-1.

NASA N62-11731 $11.00

Electric Boat Div., General Dynamics Corp., Groton, Conn.
PHOTOSYNTHETIC GAS EXCHANGE IN THE CLOSED ECOSYSTEM FOR SPACE. PHASE II, PART I. PILOT PHOTOSYNTHETIC GAS EXCHANGE STUDIES, by Edward A. Zuraw, Barry J. Weissman and others. Rept. on NASA Contract NASw-95. Aug 61, 141p. 17 refs. U411-61-131.

NASA N62-11733 $5.60

Electric Boat Div., General Dynamics Corp., Groton, Conn.
PHOTOSYNTHETIC GAS EXCHANGE IN THE CLOSED ECOSYSTEM FOR SPACE. PHASE II, PART III. SCREENING FOR THERMOPHILIC ALGAE AND MUTATION STUDIES, by N. L. Richards and R. J. Benoit. Rept. on NASA Contract NASw-95, Aug 61, 53p. 26 refs. U411-61-107.

AD-269 015 $5.00 repriced

General Dynamics/Astronautics, San Diego, Calif.
APPROXIMATE TRANSFER FUNCTIONS FOR FLEXIBLE-BOOSTER-AUTOPILOT ANALYSIS, by David R. Lukens, Alfred F. Schmitt, and George T. Broucek. Rept. on Contract AF 33(616)7037. Apr 61, 311p. 92 refs. Rept. no. AE61-0198; WADD TR 61-93.

DESCRIPTORS: Guided missiles, Surface to surface, Hypervelocity vehicles, Liquid rocket propellants, Motion, Booster rockets, Elasticity, *Dynamics, Moments, Stability, Stability (Lateral), Stability (Longitudinal), Automatic, Stabilization systems, Servo systems, *Control systems, Automatic pilots, Mathematical analysis, Numerical analysis, Functions, Mathematical prediction, Equations.

Information is presented to enable an engineer to understand and analyze the phenomena associated with a flexible-booster-and-autopilot analysis. Simplifications and approximations are given for all phases of synthesis and analysis, and the limitations of the simplified solutions are discussed. The development of methods for synthesis and analysis of flexible boosters is presented in several stages-from simple linear techniques useful for predesign or preliminary design analysis, up to the complex forms requiring computer solutions, which may be used to verify the adequacy of the final flexible-booster-and-autopilot configuration. The methods of synthesis and analysis are presented with 3 limitations: (1) a linear airframe is assumed (2) the aerodynamic surfaces (wings) are assumed to be small and relatively rigid and (3) the aerodynamics are represented by a simple quasi-steady model. Results indicate that accurate solutions for most nonwinged flexible boosters can be achieved by simple root-locus techniques involving linearized equations. (Author)

PB 160 462 $15.50

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
A RECOVERABLE INTERPLANETARY SPACE PROBE. VOLUME III. ENGINEERING ANALYSES. Rept. on Contract AF 04(647)303. July 59, 239p. 27 refs. Rept. R-235; AFBMD Document no. 9-6823, Vol. III; AD-248 159.

DESCRIPTORS: *Space probes, *Recovery, Design, Photographic intelligence, Planets, Power supplies, Solar energy, Electrical equipment, Photoelectric cells, Communication systems, Re-entry vehicles, Photographic equipment, Cosmic rays, Van Allen radiation belt, Digital computers, Reliability.

Contents:
Electrical system
Description of the accessories
Computer
Microrocket
Communication system
Re-entry vehicle design
Photographic prospect
Radiation environment

PB 160 479 $15.00

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
A RECOVERABLE INTERPLANETARY SPACE PROBE. VOLUME IV. APPENDICES. Rept. on Contracts AF 04(645)9 and AF 04(647)303. July 59, 223p. 3 refs. Rept. R-235; AFBMD Document no. 9-6823, Vol. IV; AD-254 611.

DESCRIPTORS: *Space probes, *Recovery, Design, Photographic intelligence, Planets, Photographic analysis, Re-entry vehicles, Mars, Earth, Solar systems, *Orbital flight paths, *Space navigation, Celestial mechanics, Spaceships, Perturbation theory, Celestial navigation, Velocity, Digital computers, Errors, Matrix algebra, Analysis, Transmission, Programming, Rocket propulsion.

A preliminary design is presented of a vehicle whose mission is to return safely to Earth with a useful payload which could be a high resolution photograph of a neighboring planet. Navigational techniques and interplanetary orbits were studied in detail to determine basic performance and accuracy attainable for a variety of interplanetary missions. These numerical results, assuming reasonable navigational instrument errors, indicate that only moderate propulsion requirements for orbital velocity corrections are necessary. The vehicle weight in the preliminary design is well within the capability of soon to be available rocket vehicles for initial boost into a planetary transfer orbit. The vehicle presented contains an automatic navigation and attitude control system using a digital computer and electromechanical-optical accessories, a micro-rocket system for making navigational corrections, a long range communication system for transmitting useful intelligence, and a re-entry vehicle with associated radio and light beacon aids for the physical recovery of the payload. The over-all vehicle weight is approximately 340 pounds. (Author)

LA-2677 $1.50

Los Alamos Scientific Lab., N. Mex.
PERFORMANCE OF OPTIMIZED MULTISTAGE ROCKETS, by Ralph S. Cooper. Rept. on Contract W-7405-eng-36. 28 May 62, 58p. 7 refs.

NASA N62-11327 $6.60

Marquardt Corp., Van Nuys, Calif.
PYROLYTIC GRAPHITE THRUST CHAMBER DEVELOPMENT, by C. D. Coulbert and J. G. Campbell. Quarterly progress rept. no. 2, 8 Sep-7 Dec 61 on NASA Contract NAS7-54. 22 Dec 61, 64p. 119 refs. PR-264 2Q.

MND-P-3018-I $0.50

Martin [Marietta Corp.] Baltimore, Md.
SNAP RADIOISOTOPE SPACE PROGRAMS. Quarterly progress rept. no. 10, 1 Jan-31 Mar 62, on Contract AT(30-3)-217. 31 Mar 62, 19p. 7 refs.

NASA N62-11771 $23.50

McDonnell Aircraft Corp., St. Louis, Mo.
CAPSULE NO. 18 INSTRUMENTATION REPORT FOR PROJECT MERCURY, by J. J. Coldwell. Rept. on NASA Contract NAS5-59. 24 Nov 61, 452p. SEDR-63-18.

NASA N62-11734 $2.60

Minneapolis-Honeywell Regulator Co., Minn.
STUDY OF SELF-EVALUATING STATE VECTOR CONTROL WITH APPLICATIONS TO FLEXIBLE LIQUID-FUELED AERIAL AND SPACE VEHICLES, by C. R. Stone. Quarterly progress rept. no. 3, 19 Sep-19 Dec 61, on NASA Contract NASr-27. 22 Dec 61, 24p. 10 refs. MH MPG rept. 1529-QR-3.

NASA N62-11805 $5.60

Missile and Space Systems Div., Douglas Aircraft Co., Santa Monica, Calif.
FLIGHT REPORT VEHICLE 317/2020/3020, DELTA PROGRAM-MISSION NO. 7, TIROS D PAYLOAD. Rept. on NASA Contract NASw-38. Mar 62, 56p. 4 refs. SM-41505.

PB 161 649 $0.50

National Bureau of Standards, Boulder, Colo.
A WIRE EXPLODER FOR GENERATING CYLINDRICAL SHOCK WAVES IN THE CONTROLLED ATMOSPHERE, by D. L. Jones and K. B. Earnshaw. May 62, 11p. 7 refs. Technical note no. 148.

DESCRIPTORS: *Exploder mechanisms, Wire, Design, Detonation, *Controlled atmospheres, Cylindrical bodies, *Shock waves, Production, Optics, Microwaves.

A design for a rugged exploding wire device is given. This device permits the study of strong cylindrical shock waves in controlled atmospheres using optical and microwave techniques. Adequate detail and pictures are given to allow construction of the device. (Author)

PB 161 535 (Rev. 4) $0.75

Office of the Director of Defense Research and Engineering, Washington, D. C.
TECHNICAL RESOURCES DIRECTORY: MISSILE GROUND SUPPORT EQUIPMENT NO. 6. 1 May 62, 28p.

DESCRIPTORS: *Guided missiles, *Military equipment, *Directories, *Ground support equipment.

Through its extensive research and engineering programs, the Department of Defense is developing material and equipment designed to meet present and future military requirements. This directory of military technical resources is intended to encourage communication in the Military Departments and in industry in the area of ground support equipment for missile systems. (Supersedes issue no. 5, Nov 61, PB 161 535 (Rev. 3))

SCTM-242-61(71) $2.60

Sandia Corp., Albuquerque, N. Mex.
PROBE COEFFICIENT ANALYSIS OF THE SANDIA CORPORATION RESEARCH SLED PROBE WATER-BRAKE, by J. W. O'Neill. Sep 61, 26p. 1 ref.

SCDR-54-62 $2.60

Sandia Corp., Livermore, Calif.
TELEMETRY SIGNAL SIMULATOR, by H. D. Sorensen. Apr 62, 25p. 4 refs.

PB 160 493 $1.60

[Thompson] Ramo-Wooldridge [Inc.] Los Angeles, Calif.
ON THE SAFETY OF STRUCTURES AGAINST GROUND SHOCKS, by Y. C. Fung. Rept. on Contract AF 18(600)1190. 15 June 57, 19p. 3 refs. Rept. no. EM 7-6; GM-TR-191; AFBMD Document no. 7-5560; AD-217 247.

DESCRIPTORS: *Guided missiles, Shock resistance, *Shock waves, Mathematical analysis, Structures, Safety.

Formulas are discussed which may be useful in estimating the safety of an existing structure against ground shocks or in designing economically a supporting structure which will protect the main structure against ground shocks. A missile standing on the ground is considered, and its safety against ground shocks caused by nuclear weapons. The structure is assumed to be protected against thermal effects and direct air shock waves. (Author)

Sanitation and Safety Engineering

WT-1451 $2.00

Ammann and Whitney, New York.
RESPONSE OF PROTECTIVE VAULTS TO BLAST LOADING, by E. Cohen, E. Laing, and A. Bottenhofer. Rept. on Proj. 30.4 of Operation PLUMBBOB. Apr 61, 86p.

WT-1455 $2.75

Holmes and Narver, Inc., Los Angeles, Calif.
EVALUATION OF NUCLEAR BLAST EFFECTS ON AEC TEST-SITE FACILITIES (PARTS I, II, AND III), by R. A. Cameron, Jr., R. A. Williamson, and R. H. F. Boothe. Rept. on Contract AT(29-2)-20. Operation Plumbbob. June 59, 163p.

NASA N62-11272 $1.60

Lockheed-California Co., Burbank.
INVESTIGATION OF MECHANISM OF POTENTIAL AIRCRAFT FUEL TANK VENT FIRES AND EXPLOSIONS CAUSED BY ATMOSPHERIC ELECTRICITY. Progress rept. no. 2 for 5 Mar 62, on NASA Contract NASr-59. [1962] 10p. 2 refs. LAC-384183.

PB 159 771 $6.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
EVALUATION OF BURIED CONDUITS AS PERSONNEL SHELTERS, by G. H. Albright, J. C. LaDoux, and R. A. Mitchell. Rept. on Operation Plumbbob. 14 July 60, 70p. 35 refs. WT-1421.

DESCRIPTORS: *Shelters, Personnel, *Underground structures, Pipes, Steel, Concrete, Pressure, Nuclear explosions, *Radioactive fall-out, Construction, Safety, *Shielding, *Blast, Pressure gages, Soils, Air raid shelters, Civil engineering, Gamma rays, Thermal radiation, Radiation effects.

Twelve large-diameter buried conduit sections of various shapes were tested in the 60-to-149-psi overpressure region of Shot Priscilla to make an empirical determination of the degree of personnel protection afforded by commercially available steel and concrete conduits at depths of burial of 5, 7.5, and 10 feet below grade. Essentially, it was desired to assure that Department of Defense Class I (100-psi and comparable radiations) and Class II (50-psi and comparable radiations) protection is afforded by use of such conduits of various configurations All buried conduit sections tested provided adequate Class I protection (100-psi overpressure and comparable radiation protection) for the conditions under which the conduits were tested. Standard 8-foot concrete sewer pipe withstood 126-psi overpressure without significant damage (minor tension cracks observed); standard 10-gage corrugated-steel 8-foot circular conduit sections withstood 126-psi overpressure without significant damage; and standard 10-gage corrugated-steel cattle-pass conduits withstood 149-psi overpressure without significant damage. Durations of positive pressure were from 206 to 333 milliseconds. (Author)

PB 159 772 $9.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
EVALUATION OF BURIED CORRUGATED-STEEL ARCH STRUCTURES AND ASSOCIATED COMPONENTS, by G. H. Albright, E. J. Beck, and others. Rept. on Operation Plumbbob. Feb 61 112p. 34 refs. WT-1422.

DESCRIPTORS: *Shelters, Personnel, *Underground structures, Construction, Nuclear explosions, Radioactive fall-out, *Military equipment, *Blast, Pressure gages, Air conditioning equipment, Shielding, Electrical equipment, Gamma rays, Thermal radiation, Countermeasures, Safety, Steel.

Three underground corrugated-steel arch structures covered with 5 feet of earth were subjected to peak overpressures of 60 and 100 psi during Shot Priscilla at the Nevada Test Site. Essentially, it was desired to assure that Department of Defense Class II (50-psi overpressure and comparable radiations) protection is afforded by two types of 25-foot diameter, 180-degree corrugated-metal arches. All arch structures provided adequate Class II protection for the conditions of the test. One arch structure, reinforced with steel arch ribs, withstood 100-psi overpressure (333-msec positive-phase duration) with no significant damage other than a cracked floor slab. A blast closure valve was tested in the ventilating system of one structure. Operation was satisfactory during the positive-pressure phase, but the valve leaked excessively during the negative-pressure phase. Prototype pits designed to partially shield emergency power generator sets against blast, missiles, and thermal radiation damage were tested to determine their adequacy. Damage assessment indicated significant but inadequate protection at the overpressures to which the generator sets were exposed. (Author)

PNE-132F $2.25

Public Health Service, Las Vegas, Nev.
OFF-SITE RADIOLOGICAL SAFETY REPORT, by O. R. Placak. Plowshare Program. Project GNOME. 22 May 62, 103p. 25 refs.

PNE-133F $0.75

Reynolds Electrical and Engineering Co., Inc., Mercury, Nev.
ON SITE RADIOLOGICAL SAFETY REPORT. Plowshare Program. Project GNOME. 22 May 62, 24p. 34 refs.

TID-13910 $5.60

Sanitary Engineering Research Lab., U. of California, Berkeley.
LOW-LEVEL TRITIUM MEASUREMENT WITH THE LIQUID SCINTILLATION SPECTROMETER, by Richard M. Hours and Warren J. Kaufman. Progress rept. 1 on Contract AT(11-1)-34. 1 Oct 59, 54p.

TID-15389 $6.60

Universal Match Corp., St. Louis, Mo.
INVESTIGATION OF THE EFFECTS OF IONIZING RADIATION ON THE SEDIMENTATION OF SEWAGE. Quarterly rept. no. 4 on Contract AT(11-1)-905. 1 Mar 62, 62p. 11 refs.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

NYO-9690 $1.10

Nuclear Science and Engineering Corp., Pittsburgh, Pa.
DEVELOPMENT OF ISOTOPE DILUTION TECHNIQUES FOR ASSAY OF FOOD ADDITIVES. Quarterly status rept. no. 2, 15 Sep-15 Dec 61, on Contract AT(30-1)-2715. 8p. 2 refs.

PB 160 476 $1.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
NUTRITIONAL ASPECTS OF THE ALL-PURPOSE SURVIVAL RATION: A CRITICAL APPRAISAL, by Doris A. Calloway. Interim rept. July 59, 19p. 28 refs. QMFCIAF rept. no. 25-59.

DESCRIPTORS: *Nutrition, *Food, *Survival, *Military rations, Proteins, Carbohydrates, Sodium compounds, Chlorides, Attitudes, Physiology, Water, Starvation.

Recent research studies bearing on the need for and composition of universal survival ration have been reviewed. It is concluded that a minimal supply of food is required under survival conditions to aid morale and to ameliorate the sequelae of starvation - ketosis, dehydration and reduced work efficiency. To assure that the food will not impair water economy, the following composition is recommended: (1) a maximum of 7 to 8 percent of the total calories as protein; (2) a minimum of 75 to 100 grams of carbohydrate; and (3) approximately 4.5 grams of sodium chloride. The components of a prototype All-Purpose Survival Ration are described. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

NASA N62-11708 $2.60

Rand Corp., Santa Monica, Calif.
THE UTILITY OF WEATHER FORECASTS TO THE RAISIN INDUSTRY, by L. L. Kolb and R. R. Rapp. Rept. on NASA Contract NASw-103. 26 June 61, 24p. 8 refs. RM-2748-NASA.

Engines and Propulsion Systems

NASA N62-11346 $9.10

Air Products and Chemicals, Inc., Allentown, Pa.
ANALYSIS OF CRYOGENIC PROPELLANT FEED SYSTEMS FOR ELECTROTHERMAL ENGINES, by E. Kehat, B. A. Buffham and others. Summary rept. on NASA Contract NAS8-1692. Oct 61, 101p. 38 refs.

PB 160 455 $10.10

Curtiss-Wright Corp., Quehanna, Pa.
LIQUID METAL REGENERATOR FOR A LIGHT-WEIGHT TURBOSHAFT ENGINE, by David R. Barnes, Peter Cherish and others. Engine test and evaluation Rept. on Contract DA 44-177-TC-687. 20 Nov 61, 128p. 8 refs. TREC Technical rept. 61-47.

DESCRIPTORS: Airplane engines, Helicopter engines, Gas turbines, *Gas turbine regenerators, *Heat exchangers, *Liquid metals, Sodium alloys, Potassium alloys, *Heat exchangers, Heat transfer, Exhaust gases, Compressed air, Compressors, Design, Tests, Fuel consumption, Effectiveness.

Purpose of these tests was to evaluate comparable performance of a 60-horsepower turboshaft engine, operated without, then with, a liquid-metal-coupled regenerator incorporated therein. The liquid metal is NaK. At comparable horsepower, 30 to 35 percent decrease in fuel consumption is accomplished by regeneration. SFC, fuel flow, exhaust gas temperature, turbine entry temperature, airflow and engine RPM are reported in detail as functions of engine brake horsepower. Heat transfer results show compatibility with design data. (Author)

APEX-903 $10.50

General Electric Co., Cincinnati, Ohio.
CORE TEST FACILITY, by H. S. Daniel and J. I. Trussell. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. 8 Mar 62, 141p. 7 refs.

APEX-904 $13.50

General Electric Co., Cincinnati, Ohio
HEAT TRANSFER REACTOR EXPERIMENT NO. 1, by G. Thornton, S. H. Minnich, and C. Heddleson. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. 28 Feb 62, 197p. 9 refs.

NASA N62-11440 $1.10

Marquardt Corp., Van Nuys, Calif.
STUDY OF CHAMBER COOLING TECHNIQUES FOR SPACECRAFT ENGINES, by C. D. Coulbert. Monthly letter progress rept. for 13 Mar-12 Apr 62, on NASA Contract NAS7-103. 19 Apr 62 [6]p. PR-278-2.

NASA N62-11736 $3.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
CONTROLLABLE THRUST CHAMBER STUDY PROGRAM, TASK II, by G. Huson and H. Feigel. Rept. for 15 July-15 Oct 61, on NASA Contract NAS5-1020. [1961] 35p. 3 refs. Rept. RMD-6004-Q2.

Machine Parts and Mechanisms

NASA N62-11768 $1.60

Marlin-Rockwell Corp., Jamestown, N. Y.
METHOD OF PRODUCING IMPROVED BEARING COMPONENTS BY ELIMINATION OR CONTROL OF FIBER ORIENTATION, INCLUDING MAGNETIC ANALYSIS, by D. R. Wensing, S. Hujber, and W. G. Burgett. Quarterly rept. no. 9, 16 Mar-15 Sep 61, on NASA Contract NASw-72. 9 Oct 61, 13p.

NASA N62-11769 $1.60

Marlin-Rockwell Corp., Jamestown, N. Y.
METHOD OF PRODUCING IMPROVED BEARING COMPONENTS BY ELIMINATION OR CONTROL OF FIBER ORIENTATION, INCLUDING MAGNETIC ANALYSIS, by D. R. Wensing, S. Hujber, and W. G. Burgett. Quarterly rept. no. 10, 16 Sep-15 Dec 61, on NASA Contract NASw-72. 8 Jan 62, 12p.

MATERIALS

TID-15352 $2.60

Illinois U., Urbana.
PROPERTIES OF MATERIALS AT LOW TEMPERATURES. Progress rept. on Contract AT (11-1)-1056. Mar 62, 29p. 11 refs.

NASA N62-11772 $6.60

Lockheed Nuclear Products, Marietta, Ga.
EFFECT OF NUCLEAR RADIATION ON MATERIALS AT CRYOGENIC TEMPERATURES. Quarterly progress rept. no. 5, July-Sep 61, on NASA Contract NASw-114. [1961] 70p. 10 refs. NR-132.

PB 160 511 $7.60

Narmco Industries, Inc., San Diego, Calif.
RESEARCH AND DEVELOPMENT OF HIGH TEMPERATURE STRUCTURAL ADHESIVES, by Harold H. Levine. Quarterly progress rept. no. 2, 1 Dec 60-28 Feb 61, on Contract NOw 61-0254-c. Mar 61, 78p. 4 refs. AD-253 680.

DESCRIPTORS: *Adhesives, *Heat resistant polymers, *Laminates, Phenolic resins, Pyrolysis, Oxidation, Synthesis, Metals, Bonding, Bonded joints, Tensile properties, Phenyl radicals, Methanes, Temperature, Antioxidants, *Resin adhesives.

A new, semi-inorganic adhesive was found which gave approximately 700 psi after an hour at 900 F and approximately 900 psi after ten minutes at 1000 F. When heat soaked at 500 F in air, on steel, and tested at 500 F, this adhesive exhibited extremely good resistance to degradation for 1000 hours. A value of 1150 psi was obtained after 250 hours at 500 F. The adhesive remained unchanged in tensile shear strength from 500 to 1000 hours, giving 777 psi to 707 psi, respectively. This unusual behavior prompted a mechanism study to determine what reaction occurred between the organic adhesive and the inorganic reactant. Polynuclear hydrocarbons were found to selectively inhibit free redical oxidation of diphenylmethane. During these mechanism studies, the formation of benzaldehyde was drastically reduced, indicating little bond rupture. However, oxidation to the more heat stable ketone, benzophenone continued. It is hoped that this will be useful in synthesizing more stable polymers or lead to a high temperature anti-oxidant. (Author)

CNLM-1802-15 $2.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
RADIATION EFFECTS ON ALUMINUM, ELASTOMERS, AND LUBRICANTS, comp. by Elizabeth A. Cernak. A Bibliography. 4 Apr 60, 29p. 145 refs.

AD-275 520 $0.50

Rock Island Arsenal Lab., Ill.
SYNTHESIS OF POLYESTER ELASTOMERS FOR POTENTIAL HIGH TEMPERATURE USE, by Ronald R. Freeman. 20 Feb 62, 17p. 5 refs. Rept. no. 62-650.

DESCRIPTORS: *Polymers, Esters, *Elastomers, Synthesis, Temperature, Vulcanizates, Heat tolerance, Physical properties, Diabasic acids, Chlorides, Aliphatic compounds, Glycols, Phenols, Fluorides, Pentanols, Heat resistant polymers, *Rubber

Results are presented on the synthesis of polyesters from (1) aromatic diacids or their dichlorides and aliphatic glycols, (2) diphenols and aliphatic diacids or their dichlorides, (3) aromatic diacids or their dichlorides and 2, 2, 3, 3, 4, 4 hexafluoro-1, 5-pentanediol, and (4) a dihydro dicylic diether and aliphatic glycols. Polyesters from para aromatic diacids or para diphenols were flexible to brittle solids at room temperature. In contrast, polyesters from meta aromatic diacids or resorcinol were high molecular weight elastomeric gums. Aliphatic diacid chlorides had to be used to obtain high molecular weight polymers from diphenols. Stiff, rubbery polymers of moderate molecular weight were obtained from the condensation of aromatic diacids or their dichlorides and hexafluoropentanediol. A high molecular weight elastomeric gum resulted from a dihydro dicyclic diether and sebacic acid. Vulcanizates based on these cyclic, aromatic, and aromatic fluorinated polyesters showed no improvement in heat resistance in comparison with aliphatic polyester based vulcanizates. Radiation resistance (with the exception of the cyclic polyester) was considerably improved in these materials when compared with aliphatic-polyesters. (Author)

ORO-461(Rev.) $8.60

Southern Research Inst., Birmingham, Ala.
THE TRUE STRESS-STRAIN PROPERTIES OF BRITTLE MATERIALS TO VERY HIGH TEMPERATURES. 28 July 61, rev. 28 Oct 61, 99p. SRIB 5081-1190-XIV.

Ceramics and Refractories

DC-58-7-146 $4.60

General Electric Co., Cincinnati, Ohio.
STRESS-STRAIN-TEMPERATURE-TIME RELATIONSHIPS IN REFRACTORY MATERIALS, by R. D. Chipman. Preliminary rept. on Contract AT(11-1)-171. 23 July 58, 40p. 6 refs.

NASA N62-11305 $1.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
THE TERRESTRIAL ORIGIN OF LIBYAN DESERT SILICA-GLASS, by Alvin J. Cohen. Rept. on NASA Grant NsG 57-60. [1960] [11]p. 14 refs.

Fuels, Lubricants, and Hydraulic Fluids

NYO-9849 $1.60

Consolidation Coal Co., Library, Pa.
UTILIZATION OF RADIOACTIVE ISOTOPES IN COAL PROCESS RESEARCH, by P. M. Yavorsky and E. Gorin. Quarterly technical status rept. no. 10, 1 Sep-30 Nov 61, on Contract AT(30-1)-2350. 1 Jan 62, 19p.

NASA N62-11280 $11.00

Little, Arthur D., Inc., Cambridge, Mass.
LIQUID PROPELLANT LOSSES DURING SPACE FLIGHT. Combined quarterly progress rept. nos. 3 and 4, 1 June-30 Nov 61 on NASA Contract NAS5-664. Nov 61, 137p. 57 refs. Rept. 63270-00-03.

PB 160 008-1 $6.60

Polytechnic Inst. of Brooklyn, N. Y.
COMBUSTION INSTABILITY: LIQUID STREAM AND DROPLET BEHAVIOR. PART I. EXPERIMENTAL AND THEORETICAL ANALYSIS OF EVAPORATING DROPLETS, by Fred L. Schuyler. Rept. for June 57-30 Oct 59, on Contracts AF 33(616)5163 and AF 49(638)165. Sep 60, 61p. 20 refs. WADC Technical rept. 59-720, Part I; AD-247 151.

DESCRIPTORS: *Drops, *Evaporation, Drag, Velocity, *Combustion, Stability, Theory, *Fuel sprays, Fuel injection, Fluid flow.

Both theoretical and experimental distance and time histories of evaporating droplets moving in a linearly-increasing-with-distance flow field are presented. Assumptions used in the theoretical phase concerning drag coefficient and vaporization rate were investigated by experimental observations. For this case the drag coefficient of droplets is much higher than those predicted by Stokes law. The greater the acceleration of the droplets, the closer their drag coefficient corresponds to Stokes law. Relative velocities between the air and droplet of 350 in/sec or less, the vaporization rate is constant. For relative velocities greater than 350 in/sec there is a sharp increase in vaporization rate. Some droplets were followed until breakup. Weber numbers of approximately one were found to correspond to droplet breakup. Other parameters in addition to those used in the Weber number must be taken into account before it is possible to predict droplet breakup. A comparison of Phase I and Phase II showed that for the range in which the vaporization rate of Phase II was constant, the theory agrees within approximately 15 per cent with the experimental results. (Author)

PB 160 008-2 $1.60

Polytechnic Inst. of Brooklyn, N. Y.
COMBUSTION INSTABILITY: LIQUID STREAM AND DROPLET BEHAVIOR. PART II. ESTIMATING PRIMARY LIQUID BREAK UP WITH HEAT TRANSFER CONSIDERATIONS, by M. Imber. Rept. on Contract AF 33(616)5163. Sep 60, 17p. 6 refs. WADC Technical rept. 59-720, Part II; AD-246 917.

DESCRIPTORS: *Combustion, Stability, Jets, Heat transfer, *Fuel injection, *Fuel sprays, *Rocket motors, Temperature, Mathematical analysis, *Drops

Mathematical expressions are obtained which describe the temperature rise and radius decrease of a liquid jet which enters a high temperature ambient. From these relations the primary jet break up distance may be estimated. (Author) (See also PB 160 008-1)

PB 160 008-3 $8.60

Polytechnic Inst. of Brooklyn, N. Y.
COMBUSTION INSTABILITY: LIQUID STREAM AND DROPLET BEHAVIOR. PART III: THE RESPONSE OF LIQUID JETS TO LARGE AMPLITUDE SONIC OSCILLATIONS, by Imants Reba and Coleman Brosilow. Rept. on Contract AF 33(616)5163. Sep 60, 91p. 10 refs. WADC Technical rept. 59-730, pt. 3; AD-246 918.

DESCRIPTORS: *Combustion, Stability, *Rocket motors, *Fuel injection, Jets, Oscillation, Fuel injectors *Fuel sprays, *Jet acoustic oscillations, Pressure, *Drops.

Liquid jet behavior in the presence of a strong sound field has been investigated. Experiments were carried out at room temperature. The mean absolute chamber pressures ranged from 15 to 45 psia. Sound pressures ranging from 5 percent to 30 percent of the mean chamber pressures at frequencies from 200 to 1000 c/sec were generated in the chamber. Injection velocities up to 100 ft/sec were investigated. Pronounced periodicity in liquid streams was observed in the presence of sufficiently high pressure amplitudes in the chamber. Parametric relationships between various injector, injection and disturbance parameters which determine the occurrence of periodicity in liquid streams have been established. An analytical model that can be used to predict periodicity in liquid streams as a function of system parameters has also been developed. The findings reported in this paper are pertinent to problems encountered in scaling-up rocket motors and establishing a rational injector design criterion. (Author) (See also PB 160 008-2)

NASA N62-11029 $4.60

Stanford Research Inst., Menlo Park, Calif.
A SURVEY AND EVALUATION OF HIGH ENERGY LIQUID CHEMICAL PROPELLANT SYSTEMS, by Adolph B. Amster. Quarterly rept. no. 4, 16 Dec 61-15 Mar 62, on NASA Contract NASr-38. 4 Apr 62, 41p. SRI Proj. PRU-3652.

Plastics

PB 160 514 $1.60

Plastics Lab., Princeton U., N. J.
[HIGH POLYMER RESEARCH] by L. F. Rahm. Quarterly rept. no. 59, 1 Aug-31 Oct 60, on Contract DA 36-039-sc-78105, 1 Nov 60, 15p. 14 refs. Contract rept. 8; AD-248 981.

DESCRIPTORS: *Polymers, Ferrocenes, Chemical bonds, Hydrogen, *Dielectrics, *Mechanical properties, *Plastics, Semiconductors, Amides, Metalorganic compounds, Embedding substances.

Contents:
Chemical section
- Ziegler polymerization of non-conjugated double bond systems
- Directional hydrogen bonding-property relationships in polyamides
- Ferrocene chemistry
- Intramolecular pi-hydrogen bonding

Dielectrics section
- Semiconduction in high polymers
- Melt behavior of sheared high polymers
- Stereoregularity and dielectric behavior of high polymers

Mechanical section
- Dynamic mechanical properties of polyethylenes
- Dynamic mechanical properties of polybutene
- Polymer melt elasticity
- Elastic melt extrusion

Cold working of polycrystalline polymers
Low-temperature properties of polypropylene

AD-265 574 $1.60

Rock Island Arsenal Lab., Ill.
FRICTION AND WEAR PROPERTIES OF PLASTIC COATINGS APPLIED BY THE FLUIDIZED BED PROCESS, by F. Blessin. 24 Aug 61, 16p. 4 refs. Rept. no. 61-3143.

DESCRIPTORS: *Aluminum, Coatings, *Plastic coatings, *Epoxy resins, Polymers, *Amides, Additives, Grpahite, Friction, Corrosion inhibition, Tests, Test methods, Mechanical properties, Fluidized solids.

Epoxy and polyamide plastic coatings applied on aluminum by the fluidized bed process were tested without lubrication for wear and friction in sliding contact with a like plastic, anodized aluminum, and cadmium plated steel. Ambient temperature range of tests was minus 65 F to 160 F, maximum load was 600 psi and maximum speed was 5 fpm. Polyamide coating showed negligible wear, with friction coefficients from .13 to .26. Epoxy coatings showed wear grooves with a maximum depth of .003 inch, and with friction coefficients between .05 and .50. Addition of flake graphite to the epoxy coating increased friction. Application of the polyamide coating required a preheat temperature of 750 F, which precludes its use on heat treated aluminum. (Author)

MATHEMATICS

TID-3568 $0.50

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
CRITICAL PATH SCHEDULING, comp. by Hugh E. Voress, Elmer A. Houser, Jr., and Fred E. Marsh, Jr. A preliminary literature search. Oct 61, 27p. 255 refs.

NYO-9601 $5.60

Institute of Mathematical Sciences, New York U., N. Y.
ON THE GREEN'S FUNCTION FOR THE LINEARIZED VLASOV EQUATION. Rept. on Contract AT(30-1)-1480. 15 Jan 62, 52p. 4 refs. MF-26.

PB 160 463 $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
EXPANSION AND BOUNDEDNESS THEOREMS FOR SOLUTIONS OF LINEAR DIFFERENTIAL SYSTEMS WITH PERIODIC OR ALMOST PERIODIC COEFFICIENTS, by Michael Golomb. Rept. on Contract DA 11-022-ORD-2059. 7 Feb 58, 49p. 14 refs. MRC Technical summary rept. no. 20; AD-157 728.

DESCRIPTORS: *Differential equations, Solutions, Theory, Series, Fourier analysis, Real variables, Complex variables.

Systems of the form $\frac{1}{i} K \frac{dw}{dz} = Aw + \lambda B(z) w$ are studied, where the independent variable is real or complex, and the variable coefficients which are the components of the matrix B(z) are periodic, almost periodic, or have general nonharmonic Fourier expansions $B(z) = B_0 + \sum_{k \geq 1} B_k e^{i\rho_k z}$ with arbitrary complex exponents $i\rho_k$. Solutions are obtained which are generalizations of those for periodic systems established by the Floquet theory. They are of the form: $w(z) = e^{i\tau z} \sum_{r \geq 1} C_r e^{i\omega_r z}$, where the ω_r are linear combinations of the ρ_k with non-negative integral coefficients. Explicit expansions are obtained both for the coefficients C_r and for the determining equation (in general transcendental) whose roots are the characteristic exponents τ. (Author)

PB 161 626 $1.00

National Bureau of Standards, Washington, D. C.
OMNIFORM 1: A GENERAL PURPOSE MACHINE PROGRAM FOR THE CALCULATION OF TABLES OF FUNCTIONS GIVEN EXPLICITLY IN TERMS OF ONE VARIABLE, by Joseph Hilsenrath and Gerald M. Galler, May 62, 40p 5 refs. Technical note no. 125.

DESCRIPTORS: *Function, *Special functions, Tables, *Programming, Digital computers, Computers, Scheduling.

A general purpose computer program, designed for use by non-programmers requiring computation of tables of functions written explicitly in terms of one variable, is described. The program features include: 22 types of elementary and special functions; provision for taking of functions of functions, table read-in, flexible print-out; and standardized input to a variety of problems. The use of the program is illustrated with a number of sample problems. (Author)

MECHANICS

NASA N62-11707 $1.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
AN INVESTIGATION OF UNSTABLE SHEAR FLOWS AND THEIR RELATION TO AERODYNAMIC NOISE, by Erik Mollo-Christensen. Progress rept. no. 4, Mar-Dec 61, on NASA Grant NsG-31-60. 11 Jan 62, 18p.

AGN-3059 $3.60

Aerojet-General Nucleonics, San Ramon, Calif.
CONSTRUCTION AND EVALUATION OF A DYNAMIC CREEP TEST MACHINE, by R. S. Carey. Rept. on Contract AT (04-3)-251. Dec 59. 39p.

AGN-8045 $2.60

Aerojet-General Nucleonics, San Ramon, Calif.
ENGINEERING INVESTIGATIONS OF CENTRIFUGAL CREEP TESTING MACHINE, by J. Hull. Progress rept. 1 July-30 Nov 61. on Contract AT (04-3)-368. 8 Dec 61, 22p.

PB 153 799 $15.00

Bell [Aerosystems Co.] Buffalo, N. Y.
UNELASTIC BEHAVIOR OF STRUCTURES SUBJECTED TO CYCLIC, THERMAL AND MECHANICAL STRESSING CONDITIONS, by Joseph Padlog, Rolland D. Huff, and George F. Holloway. Rept. for 15 Apr 59-15 Apr 60, on Behavior of Structures Subjected to Many Applications of Load and Temperature, Contract AF 33(616)6448. Dec 60, 221p. 22 refs. WADD Technical rept. 60-271; AD-252 761.

DESCRIPTORS: *Structures, *Airframes, Beams, Stresses, Thermal stresses, Plastic flow, Fatigue (Mechanics), Rupture, Temperature, Plasticity, Aluminium alloys, Loading, Tensile properties, Load distribution, Creep, Mathematical analysis, Aerodynamic heating.

A general analytical procedure is outlined for structures subjected to varying thermal and mechanical stressing conditions. Consideration is given to the accumulation of time-independent plastic strains and creep strains. Stress-strain-temperature-time relations for uniaxial and multiaxial stresses are defined, based on various material behavior assumptions. Several of the assumptions are compared with a limited number of time-varying temperature and uniaxial stress tests. The procedure is illustrated by its application to uniaxial stress problems in which planes originally plane remain plane and to plane stress plate problems. A solution, based on the influence coefficient approach to the plane stress plate problem, is obtained which is applicable to all plate plan forms, edge boundary conditions, and inplane thermal and mechanical loading conditions. (Author)

PB 160 504 $3.60

Coast Guard, Washington, D. C.
ANALYSIS OF OCEAN WAVE FORCES ON THE CONCRETE PILE FOUNDATION FOR ST. JOHN'S FOG SIGNAL. 16 May 55, 31p. Civil Engineering rept. no. CG-250-16; AD-220 967.

DESCRIPTORS: *Structures, Stresses, *Ocean waves, *Fog signals, Design, Concrete, *Foundations (Structures).

PB 160 505 $1.60

Coast Guard, Washington, D. C.
LATERAL LOADING ON PILES. RESISTANCE TO OVERTURNING OF A SINGLE PILE SUBJECTED TO HORIZONTAL LOADS. 15 May 55, 19p. Civil Engineering rept. no. CG-250-15; AD-220 965.

DESCRIPTORS: *Beams, Structures, *Cantilever beams, Moments, Soils, Mechanical properties.

NASA N62-11741 $1.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
RESEARCH ON VIBRATORY-OUTPUT ANGULAR MOTION SENSORS, by Richard W. Bush and Richard Swerdlow. Status rept. no. 1, June-Nov 61 on NASA Grant NsG-149-61. Dec 61, 13p. Rept. ESL-SR-130; MIT Proj. DSR 8836.

NASA N62-10985 $6.60

Engineering Mechanics Lab., Space Technology Labs., Inc., Los Angeles, Calif.
BUCKLING OF SHELLS UNDER DYNAMIC LOADS, by M. V. Barton, J. D. Wood and others. Final rept. on NASA Contract NASr-56. 26 Oct 61, 62p. 13 refs. EM 11-22; Rept. no. 8622-0001-RU-000.

TID-14470 $3.60

General Electric Co., Cincinnati, Ohio.
A PROGRAM FOR THE COMPUTATION OF THERMAL STRESSES IN A LONG CYLINDER (HOLLOW OR SOLID) by H. B. Stigall. Preliminary rept. on Contract AT(11-1)-171. 13 Oct 58, 35p. 2 refs. DC 58-10-154.

NYO-9666 $1.10

Pennsylvania State U., University Park.
STRESSES AT NOZZLE CONNECTIONS OF PRESSURE VESSELS. THE EFFECT OF PRESSURE AND EXTERNAL BENDING MOMENTS ON INSERT NOZZLE I, by D. E. Hardenbergh and S. Y. Zamrik. Quarterly rept. 1 Oct-31 Dec 61, on Contract AT(30-1)-1874. 10 Jan 62, 8p.

Aerodynamics and Pneumatics

PB 160 045 $2.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE ANALYTICAL THEORY OF CHARACTERISTICS OF INVISCID GAS DYNAMICS. PART II. SHOCK FORMATION AND HEAT ADDITION IN ONE-DIMENSIONAL FLOW, by R. E. Meyer. Technical rept. no. 24 on Contract Nonr-562(07). May 59, 28p. 12 refs.

DESCRIPTORS: *Gas flow, Dynamics, Theory, *Shock waves, Production, Propagation, Entropy, Heating, *Thermodynamics, Partial differential equations, Differential equations.

The present state of the theory of shock formation in a simple wave is discussed. In particular, the only existing proof (due to Pillow) of the basic relation of Shock-Expansion Theory is summarised, and a simple solution of the Shock-Expansion problem is described. An example of the use of the characteristics concept for the discussion of the asymptotic approach of a transient to a steady state is described in the section on heat addition to flow in a pipe. (Author)

PB 160 046 $7.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE ANALYTICAL THEORY OF CHARACTERISTICS OF INVISCID GAS DYNAMICS. PART III. TWO-DIMENSIONAL SUPERSONIC FLOW, by R. E. Meyer. Technical rept. no. 25 on Contract Nonr-562(07). Nov 59, 80p. 22 refs.

DESCRIPTORS: *Gas flow, Dynamics, *Supersonic flow, Theory, Shock waves, Entropy, Convection, Differential equations, Partial differential equations.

The theory of the structure of the equations governing steady, homentropic, irrotational flow is presented. The non-classical uniqueness questions arising in the formulation of most physical problems are discussed. The main part of the report is devoted to the discussion of the role of wave fronts, branch lines and limit lines as elements of the solutions. From their understanding are developed, on the one hand, the homentropic approximation to the theory of shock formation in a region of wave interaction, and on the other hand, effective analytical methods for treatment of the wave interactions arising in physical problems. An introduction to entropy convection effects is given. (Author) (See also PB 160 045)

PB 160 047 $2.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE ANALYTICAL THEORY OF CHARACTERISTICS OF INVISCID GAS DYNAMICS. PART IV. AXIALLY SYMMETRICAL STEADY FLOW, by R. E. Meyer. Technical rept. no. 26 on Contract Nonr-562(07). July 59, 23p. 11 refs.

DESCRIPTORS: *Gas flow, Dynamics, *Axially symmetric flow, Theory, Differential equations, Shock waves, Partial differential equations.

The general focusing equations are developed and a summary of Chen's work on the basic singularity at the axis is presented. The survey concludes with a brief introduction to the ideas underlying the uniform first-order theory. (Author) (See also PB 160 046)

AD-273 553 $8.10

Institute of Aerophysics, U. of Toronto (Canada).
CHARACTERISTICS OF A RECTANGULAR WING WITH A PERIPHERAL JET IN GROUND EFFECT. PART I, by Karl Dau. Sep 61, 88p. 7 refs. UTIA Technical note no. 56.

DESCRIPTORS: Vertical take-off planes, Short take-off planes, *Flying platforms, *Wings, Jets, *Ground effect, Aerodynamics, Lift, Drag, Moments, Stability, Thrust, Model tests, Wind tunnel models, Photographic analysis, Flaps, Pitch.

Lift, drag, and pitching moment were measured on a rectangular wing with a peripheral jet in ground effect for various angles of attack and forward speeds at two heights above the ground. Low-pressure air was used for the peripheral jet for reasons of similitude. Efforts were made to make the jet velocity as uniform as possible along the peripheral slot. In addition to force measurements on the wing, flow-visualization tests on the ground board were also carried out in the wind tunnel. The results show that there exist two flight regimes for the wing. At low forward speeds the wing behaves essentially like a hovering platform. As forward speed increases a gradually increasing part of the leading-edge jet is blown back so that the wing behaves like a jet flap at high forward speeds. The transition from one flight regime to the other is gradual rather than abrupt owing to the three-dimensional character of the wing. The results also show that a considerable fraction of the jet momentum flux is recovered as thrust at negative angles of attack and low forward speeds. The wing was also found to be statically unstable about the midchord for all angles of attack, forward speeds, and the two (small) heights above ground which were tested. (Author)

AD-273 770 $5.60

Institute of Aerophysics, U. of Toronto (Canada).
THE DESIGNING OF DYNAMIC PRESSURE STAGES FOR HIGH-PRESSURE/HIGH-VACUUM SYSTEMS, by B. W. Schumacher. Rept. on Contract AF 49(638)281. Aug 61, 55p. 25 refs. UTIA rept. no. 78; AFOSR-88.

DESCRIPTORS: *Vacuum systems, Design, Dynamics, *Pressure systems, Vacuum pumps, Gas flow, Orifices, *Electron beams, *Electron guns, Gases, *Kinetic theory, Partial differential equations, Experimental data, *Spark shadowgraph photography.

For firing electron or ion beams into gas spaces with pressures near one atmosphere passages were designed having free apertures of up to 1 mm in diameter. The vacuum in the beam forming region is maintained dynamically by constant pumping. The report shows in detail what pressures can be achieved with any given aperture and pump combination, and how multistage systems can be built having a short overall length of the passage. Complete design diagrams are given. (Author)

AD-269 128 $8.60

Institute of Aerophysics, U. of Toronto (Canada).
USE OF THE COANDA EFFECT FOR THE DEFLECTION OF JET SHEETS OVER SMOOTHLY CURVED SURFACES. PART I. TEST RIG AND STONE TESTS WITH SUBSONIC. CHOKED, AND OVERCHOKED JET SHEETS, by A. B. Bailey. Aug 61, 94p. 11 refs. UTIA Technical note no. 49.

DESCRIPTORS: *Jets, Sheets, Tests, Deflection, Nozzles, Gas flow, Subsonic flow, Aerodynamics, Supersonics, Pressure, Measurement, Flying platforms, Vertical take-off planes, Short take-off planes.

In this series of tests, the attached Coanda deflection surfaces were combinations of a series of flat plates ranging in length from 1/4" to 3/4" followed by a series of circular arcs ranging in radius from 2.0" to 4.0" Turning efficiency was found to be primarily determined by the initial angle of the surface to the nozzle. Furthermore, good correlation of the present turning efficiency data with that of Von Glahn was obtained by using the parameter, surface radius to nozzle height ratio. An analysis of the surface pressure distributions indicated that, (1) there are regions of separated flow just downstream of the nozzle exit their extent being determined by nozzle pressure ratio and initial angle and, (2) the existence of regions of supersonic flow with their attendent shock systems, which is believed to account for the observed fluctuations in the surface pressure distributions (Author)

NASA N62-11780 $1.10

National Bureau of Standards, Washington, D. C.
INVESTIGATION OF BOUNDARY LAYER TRANSITION, by P. S. Klebanoff, W. Spangenberg, and G. B. Schubauer. Progress rept. for 1 July-31 Dec 61. 8 Feb 62, 6p. 2 refs. NBS rept. 7428; NASA Order R-51.

PB 160 459 $5.60

Ohio State U. Research Foundation, Columbus.
STAGNATION POINT HEAT TRANSFER ON AN AXISYMMETRIC BODY, by Robert M. Nergem. Interim technical rept. on Research in Techniques in Aero Mechanics, Contract AF 33(616)5593. Aug 61, 19 refs. ARL 44.

DESCRIPTORS: *Blunt bodies, *Heat transfer, *Aerodynamic heating, Viscosity, *Laminar boundary layer, Boundary layer, Temperature, Gases, Dissociation, Integral equations, Special functions.

An integral method is applied to the problem of stagnation point heat transfer. The resulting equations for an equilibrium laminar boundary layer are solved using a method in which the viscosity is related to the temperature through the use of a constant and an exponent. The theoretical results are correlated empirically and compared with existing experimental data. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

NASA N62-11038 $4.60

Michigan U., Ann Arbor.
CAVITATION PIT DIAMETER-DEPTH OBSERVATIONS FOR STAINLESS STEEL IN WATER, by V. F. Cramer and F. G. Hammitt. Internal rept. no. 9 on NASA Grant NsG 39-60. 1 Aug 61, 38p. 1 ref. ORA Proj. 03424.

NASA N62-10979 $2.60

Office of Research Administration, U. of Michigan, Ann Arbor.
CAVITATION AND EROSION DAMAGE MEASUREMENTS WITH RADIOISOTOPES: SUMMARY OF INTERNAL REPORT NO. 4, by William J. Walsh and Frederick G. Hammitt. Internal rept. no. 8 on NASA Grant NsG 39-60. 1 Aug 61 [22]p. 5 refs.

METALLURGY

PB 160 055 $9.60

American Electro Metal Corp., Yonkers, N. Y.
CEMENTED BORIDES, by Frank W. Glaser, William Arbiter and others. Progress rept. 1-Mar-1 Oct 61, on Contract N6onr-256, T.O. 1. 23 Jan 52, declassified 22 Apr 58. 118p. 37 refs. ATI-201 475.

DESCRIPTORS: *Rocket motor nozzles, Nozzles, Materials, Refractory materials, Metallic compounds, *Zirconium compounds, *Borides, Tests, Test equipment, Machining, Brazing, Crystal structure, Solids, Crucibles, Cesium, Gallium, Titanium, *Boron, Purification, Determination, Combustion chambers, Production, Sintering, *Powder metallurgy, Metallurgy, Hydraulic presses.

Contents:
Rocket nozzle test of cemented zirconium boride
The crystal structure of ZrB_{12}
Solid solutions of borides
Cemented zirconium boride crucibles for cesium, gallium and titanium
New test data or testing equipment
Grinding and working of bonded ZrB_2
Boron purification
Hydrostatic pressing
Part manufacture
New production equipment
Brazing of cemented borides
Determination of boron in metal borides, pub. in Analytical Chemistry 23:992-994, July 51
Simplify, speed-up sintering with Harper electric furnaces, pub. in Powder Metallurgy Bulletin 6:69
Hydraulic press for powder metallurgy. Automatic full-hydraulic single action presses having advantages of multiple function machines from 200 tons up to the highest capacities, pub. in Powder Metallurgy Bulletin 6:70-92, Dec 51

PB 160 492 $1.10

Armour Research Foundation, Chicago, Ill.
DUCTILE BERYLLIUM ALLOYS, by Frank A. Crossley and R. J. Van Thyne. Bimonthly rept. no. 4, 1 Mar-30 Apr 60, on Contract NOas-60-6036-c. 18 May 60, 10p. ARF 2187-4; AD-239 695.

DESCRIPTORS: *Beryllium alloys, Mechanical properties, Microstructure, Sintering, Aluminum alloys, Germanium alloys, *Power metallurgy, Processing, Silver alloys, Cerium, Yttrium, Calcium, Alloys,

An envelope-type microstructure prepared by liquid-phase sintering is being investigated as a means of producing ductile beryllium alloys. Partial results of evaluations of five compacts with ternary additions are reported. Ternary additions of cerium or yttrium were made to aluminum matrix compacts and of calcium, cerium, or yttrium to silver matrix compacts. The ternary additions are being tested for their effect on sinterability. Three compacts of the Be-31Al-2Ge alloy made with beryllium powders representing two sources and two particle size ranges were partially evaluated by cold pressing, annealing at 500° C for 2 hr, and then cold rolling. Total cold reductions to fracture were in the range from 36 to 43%. Alloys of the Be-Al-Ge system containing 6.4, 3.5, and 2.1 vol. % matrix, respectively, were not successfully sintered at 950° C for 1 hr. A Be-65Ag-1Ge compact was partially evaluated by cold pressing, annealing at 500° C for 2 hr, and cold rolling; total cold reduction was 47%. (Author)

TID-15371 $1.60

Colorado U., Boulder.
RESEARCH ON METALS AND ALLOYS AT LOW TEMPERATURES, by William F. Love. Final rept. 1 Dec 55-30 Nov 61, on Contract AT(11-1)-377. 9 Apr 62, 14p. 1 ref.

NYO-9858 $2.60

Crucible Steel Co. of America, Pittsburgh, Pa.
RADIOISOTOPES IN THE STUDY OF METAL-TO-METAL WEAR, by H. Ezrol and G. Steven. Rept. on Contract AT(30-1)-2291. 31 July 61, 22p. 33 refs.

PB 160 513 $8.10

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
IMPACT STRENGTH OF VARIOUS METALS AT TEMPERATURES DOWN TO 20° ABSOLUTE, by Herrick L. Johnston and Howard E. Brooks. Technical rept. no. 17 on Liquid Hydrogen as an Aircraft Fuel, Contract W33-038-ac-14794. 1 May 52, declassified 5 Nov 53. 81p. Technical rept. 264-17; AD-67.

DESCRIPTORS: *Low temperature research, *Metals, Shock resistance, Temperature, Hydrogen, Liquefied gases, Aviation fuels, Impact shock, Magnesium, Zinc, Copper, *Steel, Bronze, Brass, Aluminum, Beryllium, Nickel, Carbon, Alloys, Stainless steel, Chromium, Molybdenum, Vanadium, Manganese, Coolants.

In order to observe the behavior of pure metals and alloys at liquid-H temperatures, Charpy impact tests were conducted with specially designed equipment. The results obtained on 30 samples are given graphically; photomicrographs are also included. The temperature range was from 20° to 294°K. In general, hardness increased markedly with reduction to liquid-H temperature, and the impact strength decreased proportionally. Exceptions to this behavior were the pure metals Mg and Zn. The change in impact strength with reduction in temperature for Mg and Zn was very slight, and in the case of the commercially pure Mg, the metal was actually less brittle at the temperature of liquid H (4.5 ft. -lbs. as compared to 2.8 ft. -lbs. at room temperature). Cold-drawn specimens were generally inferior to hot-rolled specimens. Materials such as Cu showed a continuous increase in impact strength with lowering temperature. Other materials, such as Invar steel, showed a decline in impact strength as the temperature was lowered. However, most metals exhibited a maximum within the neighborhood of dry ice temperature or that of liquid air, or at some intermediate temperature.

NASA N62-11547 $1.60

Massachusetts Inst. of Tech., Cambridge, Mass.
PROPERTIES OF NICKEL - THORIA ALLOYS PREPARED BY THERMAL DECOMPOSITION OF THORIUM NITRATE, by Richard Murphy and Nicholas J. Grant. Rept. on NASA Grant NsG-117-61. [1961] [16]p. 4 refs.

NASA N62-11706 $1.10

Massachusetts Inst. of Tech., Cambridge.
THERMAL STABILITY OF $CuSiO_2$ AND Cu-Al_2O_3 ALLOYS, I. PREPARATION OF OXIDE DISPERSION STRENGTHENED NICKEL-MOLYBDENUM ALLOYS BY SELECTIVE REDUCTION, II. THE MECHANISM OF INTERNAL OXIDATION OF DILUTE NICKEL ALLOYS, III, by Noboru Komatsu, Jens Gert Rasmussen and others. Progress rept. for 15 May-15 Nov 61, on NASA Grant NsG-117-61. DSR-8692.

NASA N62-11433 $1.60

National Research Corp., Cambridge, Mass.
INVESTIGATION OF ADHESION AND COHESION OF METALS IN ULTRAHIGH VACUUM, by John L. Ham. Quarterly progress rept. no. 2 for 15 Dec 61, on NASA Contract NASr-48. 18 Dec 61, 11p.

AD-268 717 $4.60

National Research Labs., Ottawa (Canada).
THE STATUS OF KNOWLEDGE OF RESIDUAL STATIC STRENGTH OF CRACKED STRUCTURES, by E. Becze. Oct 61, 45p. 25 refs. Aeronautical rept. LR-315; NRC no. 6578.

DESCRIPTORS: *Aluminum alloys, *Steel, *Sheets, Configuration, Cylindrical bodies, Fracture (Mechanics), Failure (Mechanics), Mechanical properties, *Stresses, Grains (Metallurgy), Thickness, Airframes, Wings, Test methods, *Structures.

A compilation has been made of the experimental results that are available on the residual static strengths of structures and simple specimens. In addition to the conclusions of the separate authors which are repeated for convenience, trends indicated by attempts made to correlate the results of the various tests to yield information on the effects of several parameters are given. The parameters on the effect of which some information is available are notch root radius, grain direction, eccentricity of loading, metal manufacturing processes, thickness, length and width of specimen, and materials of fabrication. Unfortunately, information is often not comprehensive, but even if there is not enough evidence to warrant the drawing of a conclusion, the necessary areas of investigation are indicated. (Author)

TID-14745 $2.60

Northwestern U., Evanston, Ill.
A STUDY OF RADIATION DAMAGE RESULTING FROM ELECTRON BOMBARDMENT. Rept. on Contract AT (11-1)-89. 10 Jan 62, 24p.

TID-14810 $4.60

Notre Dame U., Ind.
RESIDUAL STRESS AFTER PLASTIC ELONGATION AND MAGNETIC LOSSES IN SILICON STEEL (PART I). MAGNETOSTRICTION AND RESIDUAL STRESS IN NICKEL AFTER PLASTIC ELONGATION (PART 2), by B. D. Cullity and O. P. Puri. 9 Feb 62, 48p. 39 refs.

CNLM-1784 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
BONDING OF TANTALUM. Interim rept. 17 June 59, 7p.

CNLM-1730 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
BRAZE RING MOLD FOR SINTERING AND CASTING. Final rept. 14 May 59, 4p.

TID-14779 $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
CONTINUED STUDIES OF RARE EARTH ALLOYS WITH TRANSITION METALS, by A. A. Burr, W. R. Clough and others. Progress rept. 1 May-30 Nov 61. 18 Jan 62, 11p.

CNLM-1802-14 $2.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
FABRICATION OF BERYLLIUM, comp. by Elizabeth A. Cernak. A bibliography. 1 Apr 60, 29p. 147 refs.

Ferrous Metals

XDC-59-1-173 $8.60

General Electric Co., Cincinnati, Ohio.
FABRICATION, WELDING AND TESTING OF 17-7 PH STAINLESS STEEL, by G. L. Smith. 10 Oct 58, declassified 16 June 61. 97p.

PB 160 491 $1.60

Metals Research Lab., Case Inst. of Tech., Cleveland, Ohio.
THE EFFECT OF AUTOFRETTAGE ON THE RESIDUAL STRESS PATTERN OF A 1040 STEEL TUBE COLD DRAWN 25 PER CENT. Technical rept. no. 25 on Investigation of Significant Properties and Characteristics of Cold Worked Steel, Contract DA 33-019-ORD-585. Dec 52, 18p. WAL Rept. no. 310/90-82; AD-1998.

DESCRIPTORS: *Steel tubing, Stresses, Tensile properties, Steel.

Two 30-in. lengths of cold drawn steel tube were cut and autofrettaged an average of 0.54 and 1.9% of cold work. Residual stress distributions were determined for these 2 tubes and one 15-in. length of tube not autofrettaged. The pattern for the cold drawn steel tube was tensile on the outside and compressive on the inside. The stresses were considerably reduced by the autofrettage treatment. Greater amounts of autofrettage (about 5%) probably would remove the residual stress state imposed by cold drawing.

Structural Metallurgy and Corrosion

BNL-728(C-33) $1.75

Brookhaven National Lab., Upton, N. Y.
PROCEEDINGS OF THE ELEVENTH ANNUAL AEC CORROSION SYMPOSIUM, ed. by John R. Weeks. 23-25 May 62, 64p.

NASA N62-11735 $1.60

Materials Research Lab., Inc., Richton Park, Ill.
ELEVATED TEMPERATURE STRESS CORROSION OF HIGH STRENGTH SHEET MATERIALS IN THE PRESENCE OF STRESS CONCENTRATORS, by S. Mostovoy and E. J. Ripling. Quarterly progress rept. no. 2, 1 Sep-30 Nov 61, on NASA Contract NASr-50. [1962] 16p. 3 refs.

TID-14467 $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
THE ELECTROCHEMICAL AND CORROSION CHARACTERISTICS OF RARE EARTH AND YTTRIUM METALS, by N. D. Greene, Annual progress rept. on Contract AT (30-1)-2714. Nov 61, 12p.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

PB 160 500 $1.60

Aeronautical Research Labs., Air Force Research Div., Wright-Patterson AFB, Ohio.
RADIATION CHEMISTRY OF N-PENTANE: MECHANISM FOR THE FORMATION OF LOWER MOLECULAR WEIGHT PRODUCTS, by Jean H. Futrell. Rept. on Solid State Research and Properties of Matter. Aug 60, 16p. 22 refs. ARL Technical note 60-139; AD-246 335.

DESCRIPTORS: *Pentanes, Gamma rays, *Radiation damage, Van de Graaff generators, *Molecular weight, Vapors, Ionization, Nuclear reactions, *Radiochemistry, Free radicals, Molecular spectroscopy, Mass spectroscopy, Recombination reactions.

Pyrex ampoules of n-pentane vapor were exposed to cobalt sixty gamma rays and hundred electron volt yields of the lower molecular weight products were determined. In decreasing order of importance these included hydrogen, propane, ethylene, ethane, methane, propylene, acetylene, and butane. The magnitude of the yields and the product distribution are consistent with the assumption that the reaction sequence is ionization of the molecule, fragmentation, reaction of the fragment ions with pentane molecules, and neutralization of the product ions, followed by intercombination of free radicals from these processes. Certain implications of the present mechanism are suggested. (Author)

NYO-9485 $0.75

Air Reduction Co., Inc., Murray Hill, N. J.
FISSION PRODUCT APPLICATIONS USING GASEOUS BETA SOURCES. TASK II, by William W. Graessley and John H. Zufall. Final rept. on Contract AT(30-1)-2343. Nov 61, 31p. 6 refs.

ANL-6499 $2.00

Argonne National Lab., Ill.
THE MEASUREMENT OF ENERGY AND INTENSITY OF GAMMA RAYS BY USE OF A SCINTILLATION SPECTROMETER, by R. T. Julke, J. E. Monahan and others. Rept. on Contract W-31-109-eng-38. Apr 62, 95p. 15 refs.

WAPD-T-1241 $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
MULE: A CODE FOR THE CALCULATION ON THREE TYPES OF OVERTONE MODES, by R. L. Ewen. Rept. on Contract AT(11-1)-GEN-14. Sep 60, 25p. 9 refs.

PB 160 515 $5.60

General Dynamics, Fort Worth, Tex.
EXPERIMENTAL MAPPING OF THE IRRADIATION VOLUMES OF THE CONVAIR RADIATION EFFECTS TESTING FACILITY, by B. F. Freeman and F. F. Fleming. Rept. on Contract AF 33(600)38946. 30 Nov 60, 55p. 8 refs. NARF-60-30T; MR-N-262; AD-248 147.

DESCRIPTORS: *Light water reactors, *Fuel elements, Detectors, *Radiation effects, Thermal neutrons, Gamma neutron reactions, Test facilities, Dose rate, Measurement.

An experiment involving neutron and gamma measurements in the irradiation volumes of the Radiation Effects Testing Facility for a dry-pool configuration was carried out in August 1958 at Convair's Nuclear Aircraft Research Facility (NARF). The experiment was made to map the radiation field in the region normally used for radiation-effects investigations. Each of the three irradiation volumes constituting this region was mapped with detectors spotted in a minimum of 17 locations in each of three rack positions. Neutron measurements were made with sulfur and cobalt detectors; gamma measurements were made with chemical dosimeters. The detectors were irradiated for three hours at a reactor power level of 500 kilowatts. The maximum fast-neutron flux (E greater than 2.9 Mev) received was 7.1 x 10 to the power 4 neutrons/sq cm-sec-watt; the maximum thermal-neutron flux, 2.3 x 10 to the power 3 neutrons/sq cm-sec-watt; and the maximum gamma dose rate, 2.8 x 10 to the power -1 ergs/gm(C)-sec-watt. (Author)

DC-58-6-221 $1.10

General Electric Co., Cincinnati, Ohio.
NEUTRON SLOWING DOWN MODEL USING DIRECT PROPORTIONS, by J. D. Popp. Preliminary rept. on Contract AT (11-1)-171. 24 June 58, 14p.

TEI-725 $30.30

Geological Survey, Washington D. C.
SUMMARY OF ROCK SALT DEPOSITS IN THE UNITED STATES AS POSSIBLE DISPOSAL SITES FOR RADIOACTIVE WASTE, by W. G. Pierce and E. I. Rich. May 58, 191p. 149 refs.

HW-73381 $2.00

Hanford Atomic Products Operation, Richland, Wash.
MAC: A BULK SHIELDING CODE, by E. G. Peterson. Rept. on Contract AT(45-1)-1350. Apr 62, 82p

TID-14744 $3.60

Illinois Inst. of Tech., Chicago.
AROMATIC HYDROGEN EXCHANGE, by A. J. Kresge. Annual rept. 15 Apr-31 Dec 61 on Contract AT (11-1)-1025. Jan 62, 35p. 10 refs.

TID-14855 $8.10

Kansas U., Lawrence.
RADIATION INDUCED GELATION IN LIQUID SYSTEMS, by Harold F. Stewart. Master's thesis, Jan 60, 87p. 34 refs.

UCRL-6772 $0.75

Lawrence Radiation Lab., U. of California, Livermore.
DEPOSITION OF MOLECULAR AND ATOMIC BEAMS ON SURFACES, by Forrest S. Baker and Gilbert O. Brink. Rept. on Contract W-7405-eng-48. 14 Feb 62, 30p. 19 refs.

TID-15251 $1.60

Little, Arthur D., Inc., Cambridge, Mass.
THE EFFECT OF ELECTROPHILIC ADDITIVES ON THE RADIOLYTIC PRODUCTS OF ORGANIC CHAIN REACTIONS. Quarterly rept. Nov 61-Jan 62, On Contract AT (30-1)-2904. 28 Feb 62, 11p.

NYO-9217 $3.50

Massachusetts Inst. of Tech., Cambridge.
THE EFFECT OF ELECTRON IRRADIATION PRIOR TO REACTION ON THE ACTIVITY OF A SEMICONDUCTOR CATALYST, by E. A. Mason, R. C. Reid, and N. J. Stevens. Final rept. 1 Feb 59-30 Sept 61, on Contract AT(30-1)2329. Sept 61, 258p. 101 refs.

TID-14949 $1.10

Monsanto Research Corp., Everett, Mass.
ORGANIC COOLANT RECLAMATION, by D. A. Scola and J. S. Adams. Quarterly progress rept. no. 10, 16 June-15 Sep 61, on Contract AT(10-1)-1088. Sep 61, 13p. 4 refs.

MLM-1118 $1.60

Mound Lab., Miamisburg, Ohio.
MOUND LABORATORY PROGRESS REPORT FOR AUGUST, 1961, by J. F. Eichelberger. Rept. on Contract AT(33-1)-GEN-53. 8 Dec 61, 19p.

TID-14969 $3.60

Case Inst. of Tech., Cleveland, Ohio.
PRIMARY PROCESSES IN RADIATION CHEMISTRY, by Edwin W. Abrahamson. Progress rept. 15 Feb 61-14 Feb 62, on Contract AT (11-1)-909. 32p.

UCRL-6604 $2.75

Lawrence Radiation Lab., U. of California, Livermore.
BANZAI, A ONE-DIMENSIONAL MULTIENERGY GROUP NEUTRON TRANSPORT CODE FOR THE IBM-709 AND 7090 SYSTEMS, by T. F. Wales and R. N. Stuart. Rept. on Contract W-7405-eng-48. 24 Oct 61, 157p.

TID-15366 $2.60

Oklahoma State U. Research Foundation, Stillwater.
THE ISOTOPE EFFECT IN THE STUDY OF CHEMICAL REACTIONS, by Ernest M. Hodnett, Charles R. Williams and others. Progress rept. 16 Jan 61-15 Jan 62, on Contract AT (11-1)-1049. 26 Mar 62, 29p.

RAI-100 $10.10

Radiation Applications, Inc., Long Island City, N. Y.
FOAM SEPARATION, by Jacques J. Weinstock, Eliezer Schonfeld and others. Annual rept. on Contract AT(30-1)-2384. 1 Oct 61, 122p. 12 refs.

NYO-10231 $1.60

Rochester U., N. Y.
THE ABUNDANCE OF TRITONS AND DEUTRONS IN PRIMARY COSMIC RADIATION, by M. V. K. Appa Rao and P. J. Lavakare. Rept. on Contract AT(30-1)-875. 15 May 62, 15p. 14 refs.

SCR-466 $1.10

Sandia Corp., Albuquerque, N. Mex.
NUCLEAR TEMPERATURES FROM NEUTRON BOMBARDMENT, by R. I. Ewing and T. W. Bonner. Feb 62, 6p. 5 refs.

NYO-9861 $1.10

Technical Research Group, Syosset, N. Y.
SYNTHESIS OF SEMICONDUCTOR MATERIALS BY RADIATION INDUCED REACTIONS, by Kalman Held and Richard Goldman. Quarterly status rept. no. 9, 1 May-31 July 61, on Contract AT (30-1)-2392. 2 Nov 61, 6p. 1 ref. TRG-132.

K-1476(Rev. 1) $0.75

Union Carbide Nuclear Co , Oak Ridge, Tenn.
GRAVIMETRIC FACTORS FOR URANIUM IN SELECTED COMPOUNDS, by W. D. McCluen and F. H. Anderson. Rept. on Contract W-7405-eng-26. 31 May 62, 28p 3 refs.

TID-14466 $1.80

Washington U., St. Louis, Mo.
RADIOCHEMICAL STUDIES OF FISSION PROCESSES, by A. C. Wahl. Progress rept. 1 Apr 61-1 Apr 62, on Contract AT(11-1)-85. 11 Dec 61, 6p.

TID-14869 $2.60

Washington U., Seattle.
RANGE OF ALPHA PARTICLES IN ALUMINUM, by Donald Gillmor Willhoit. Master's thesis. 58, 25p. 12 refs.

TID-15369 $1.60

Wisconsin U., Madison.
APPLICATIONS OF RADIOISOTOPES TO CHEMICAL PROBLEMS. Progress rept. on Contract AT (11-1)-32. 1 Mar 62, 17p.

Instruments and Installations

TID-3907(Rev. 1) $1.00

Atomic Energy Commission, Div. of Technical Information Extension, Oak Ridge, Tenn.
BIBLIOGRAPHY ON SEMICONDUCTOR NUCLEAR RADIATION DETECTORS, comp. by J. L. Blankenship and Henry D. Raleigh. Apr 62, 49p.

TID-15423 $1.10

Bureau of Mines, Pittsburgh, Pa.
RESEARCH ON THE HAZARDS ASSOCIATED WITH THE USE OF LIQUID HYDROGEN IN BUBBLE CHAMBERS. Progress rept. no. 3, 1 Nov 61-31 Jan 62. 9p. 6 refs.

NASA N62-11455 $2.60

California Inst. of Tech., Pasadena.
SYNCHROTRON RADIATION AS THE SOURCE OF JUPITER'S POLARIZED DECIMETER RADIATION, by David B. Chang and Leverett Davis, Jr. Rept. on NASA [Grant] NsG-151-61. [1962] [30]p. 19 refs.

TID-13717 $1.60

Cambridge Electron Accelerator, Harvard U., Mass.
A DEBUNCHING AND MOMENTUM ANALYZING MAGNET SYSTEM, by K. G. Steffen. 2 Apr 58, 12p. CEA(HU)56.

TID-13716 $1.60

Cambridge Electron Accelerator, Harvard U., Mass.
MAGNET CONSTRUCTION AND ASSEMBLY, by M. S. Livingston. 25 June 57, 14p. CEA(HU)36.

TID-13715 $1.60

Cambridge Electron Accelerator, Harvard U., Mass.
SHIELDING DESIGN OF THE CAMBRIDGE ELECTRON ACCELERATOR, by R. W. Williams. 31 Aug 56, 12p. CEA(HU)10.

DC-58-8-116 $10.50

General Electric Co., Cincinnati, Ohio.
D102A NUCLEAR SENSORS, by R. R. Swope. Preliminary rept. on Contract AT(11-1)-171. 1 Sep 58, 135p. 9 refs.

UCRL-5430-T(Rev. II) $1.60

Lawrence Radiation Lab., U. of California, Livermore.
ACCELERATOR BEAM PULSING SYSTEM WITH EXTREMELY WIDE RANGE OF PULSE LENGTHS AND PULSE REPETITION RATES, by Kristian Asland. 28 June 60, 11p.

PPAD-442-D $2.60

Princeton-Pennsylvania Accelerator, Princeton U., N. J.
THE MAGNET POWER SERVO SYSTEM FOR THE PRINCETON-PENNSYLVANIA PROTON SYNCHROTRON, by S. Waaben. Rept. on Contract AT (30-1)-2137. 20 Feb 62, 30p. 5 refs.

PPAD-435-D $2.60

Princeton-Pennsylvania Accelerator, Princeton U., N. J.
A SCINTILLATION CHAMBER IMAGE INTENSIFIER BEAM PROFILE DETECTOR, by J. R. Waters, G. T. Reynolds and others. Rept. on Contract AT(30-1)-2137. 19 Dec 61, 26p. 5 refs.

PPAD-434-E $1.10

Princeton-Pennsylvania Accelerator, Princeton U., N. J.
STATUS REPORT, by M. G. White. Status rept. on Contract AT(30-1)-2137. 6 Sep 61, 6p.

TID-14865 $9.60

Washington U., Seattle.
FAST NEUTRON DOSIMETRY OF A PLUTONIUM BERYLLIUM SOURCE, by Donald Conrad Lawrence. Master's Thesis. 22 May 58, 117p. 44 refs.

Nuclear Engineering and Power

NYO-9584 $3.60

Aeroprojects, Inc., West Chester, Pa.
APPLICATIONS OF ULTRASONIC ENERGY. TASK 2: ULTRASONIC METAL AND CERAMIC POWDER PROCESSING. TASK 3: ULTRASONIC INSTRUMENTATION. Progress rept. 1 June-31 July 61, on Contract AT(30-1)-1836. Aug 61, 32p. 12 refs.

APAE-115(Vol. III) $11.00

Alco Products, Inc., Schenectady, N. Y.
PL-3, PHASE I, TASK 3, RESEARCH AND DEVELOPMENT REPORT ON CONTRACT AT(30-1)-2900. 12 Mar 62, 150p.

ACNP-6126 $4.60

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
THREE DIMENSIONAL ANALYSIS OF BOOSTER ROD SYSTEM FOR CANDU, by R. J. Hall and P. S. Lacy. Final rept. on Contract AT(38-1)-263. 6 Dec 61, 46p. 6 refs.

ANL-6440 $1.00

Argonne National Lab., Ill.
THE ARGONNE THERMAL SOURCE REACTOR, by Roland J. Armani. Rept. on Contract W-31-109-eng-38. Mar 62, 39p. 4 refs.

ANL-6565 $1.50

Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM. Progress rept. Apr 62, on Contract W-31-109-eng-38. 15 May 62, 58p. 20 refs.

TID-14964 $1.10

Armour Research Foundation, Chicago, Ill.
STUDIES OF REACTOR CONTAINMENT. Progress rept. on Contract AT (11-1)-528. 22 Jan 62, 5p.

TID-3571 $0.50

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
FAST NEUTRON PULSE REACTORS AND FAST NEUTRON CRITICAL ASSEMBLIES, comp. by William E. Bost. A literature search. Apr 62, 19p. 122 refs.

TID-8538 $2.00

Atomic Energy Commission. Div. of Reactor Development, Washington, D. C.
SMALL POWER REACTOR PROJECTS OF THE UNITED STATES ATOMIC ENERGY COMMISSION. Information gathered as a result of the United States offer inviting the agency's participation. 28 Sep 61, 80p. 53 refs. Prepared in cooperation with International Atomic Energy Agency, Vienna.

AI-3739 $8.60

Atomics International, Canoga Park, Calif.
HAZARDS SUMMARY REPORT FOR THE WALTER REED ARMY MEDICAL CENTER NUCLEAR RESEARCH REACTOR, by Heinz H. Cappel. 6 May 59, 91p. 21 refs.

BAW-1216 $15.50

Babcock and Wilcox Co., Lynchburg, Va.
MARTY CRITICAL EXPERIMENTS: SUMMARY OF 4%-ENRICHED UO_2 CORES STUDIED FOR NMSR, by R. M. Ball, A. L. MacKinney, and J. H. Mortenson. Rept. on Contract AT(30-3)-274. May 61, 233p. 6 refs.

BAW-1247 $14.00

Babcock and Wilcox Co., Lynchburg, Va.
RESULTS OF NS SAVANNAH CORE I FUEL ROD IRRADIATION PROGRAM, by C. A. Burkart and W. R. DeBoskey. Rept. on Contract AT(30-3)-274. Apr 62, 205p. 17 refs.

BAW-1215 $9.10

Babcock and Wilcox Co., Lynchburg, Va.
SPECTRAL SHIFT CONTROL REACTOR BASIC PHYSICS PROGRAM. EXPONENTIAL EXPERIMENT HAZARD EVALUATION, by John Funderburg. Rept. on Contract AT(30-1)-2602. Dec 60, 85p. 16 refs.

BMI-1574(Del.) $2.00

Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING MARCH, 1962, by Russell W. Dayton and Ronald F. Dickerson. Rept. on Contract W-7405-eng-92. 1 Apr 62, 78p.

WAPD-AD-TH-538 $7.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
ANALYSIS AND MEASUREMENT OF FLOW OSCILLATIONS, by A. L. Blubaugh and E. R. Quandt. Rept. on Contract AT(11-1)-GEN-14. 3 Nov 60, 73p.

WAPD-T-1221 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
ANALYSIS OF URANIUM DIOXIDE CERAMIC FUEL MATERIALS FOR THE SHIPPINGPORT PRESSURIZED WATER REACTOR, by R. M. Burd, C. F. Lentz, and others. Rept. on Contract AT(11-1)-GEN-14. June 60, 20p. 7 refs.

WAPD-R (TH)-587 (Del.) $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
BETTIS THERMAL AND HYDRAULICS SECTION PRESSURE DROP DATA REDUCTION CODE, by Elaine H. Burr and B. W. LeTourneau. Rept. on Contract AT (11-1)-GEN-14. 28 May 60, 16p.

WAPD-AD-TH-544(Del.) $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
DETERMINATION OF AN AVERGE THICKNESS FOR RECTANGULAR CHANNELS: A DATA REDUCTION PROCEDURE, by Elaine H. Burr and M. Troy. Rept. on Contract AT (11-1)-Gen-14. 7 Oct 59, 12 p.

WAPD-AD-TH-507 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
THE EFFECT OF TEMPERATURE VARYING THERMAL AND ELECTRICAL PROPERTIES ON THE STEADY STATE TEMPERATURE DISTRIBUTION IN ELECTRICALLY HEATED TEST SPECIMENS, by B. W. LeTourneau. Rept. on Contract AT (11-1)-GEN-14. 16 Apr 59, 16p.

WAPD-T-1383 (Rev. 1) $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
AN EVALUATION OF THE "ZIP" SYNTHESIS DEPLETION TECHNIQUE AS APPLIED TO A PWR SEED BLANKET SLAB REACTOR, by C. D. Sphar. Rept. on Contract AT(11-1)-GEN-14. Sep 61, 17p.

WAPD-TM-285 $0.75

Bettis Atomic Power Lab., Pittsburgh, Pa.
INELASTIC DEFLECTION AND BUCKLING OF FUEL PLATES DUE TO FLUID VELOCITY AND COMPRESSIVE EDGE LOADS, by D. S. Griffin. Rept. on Contract AT-11-1-GEN-14. Apr 62, 31p. 12 refs.

WAPD-R(TH)-575 $3.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
AN INFRARED RADIATION METHOD FOR CALIBRATING TRANSIENT THERMOCOUPLES, by E. W. Fink. Rept. on Contract AT(11-1)-GEN-14. 19 Apr 60, 39p. 9 refs.

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DESCRIPTORS: *Symposia, *Plasma physics, *Reentry aerodynamics, *Communications theory, Detection, Abstracting.

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LANGMUIR PROBES IN A FLOWING LOW DENSITY PLASMA, by J. B. French. Rept. on Contract AF 49(638)823. Aug 61, 73p. 21 refs. UTIA rept. no. 79; AFOSR-2159.

DESCRIPTORS: *Microwave probes, Electrostatics, Gas flow, *Plasma jets, *Glow discharges, Argon, Electrons, Ions, Transport properties, Tungsten, Wire, Quartz, Shielding, Oscillograms, Electronic equipment

Two aspects of the use of Langmuir probes have been investigated. First, a Langmuir probe free-molecular with respect to all species, and in a plasma in which the ion temperature is higher than the electron temperature, is considered. Theoretical predictions are that both the ion current and the electron current outside the retarding field region are controlled by ion energy, instead of electron energy. Hence directed ion energy in the form of plasma mass motion is expected to influence collection. The retarding field method of measuring electron temperature is uninfluenced. Experiments in the form of comparisons between ion collecting cylindrical probes parallel and transverse to the supersonic plasma stream agree quantitatively with these predictions. Second, the situation is considered in which the electrons have much higher thermal energy than the ions, and in which the probe is free-molecular with respect to neutral particles but in continuum flow with respect to the ions and electrons. The smaller electron and ion mean free paths are calculated to have little effect on the current collected by the probe, unless mass motion is present. In this case experiments indicate that a region of increased ion density exists in front of a probe biased to reflect ions back into the oncoming stream. (Author)

PB 160 501 $3.60

Institute of Mathematical Sciences, New York U., N. Y.
WAVES ON A SPHERE, by A. S. Peters. Rept. on Contract Nonr-285(06). June 60, 38p. 1 ref. IMM-NYU 271; AD-241 157.

DESCRIPTORS: Spheres, Wave analysis, Vibrations, *Wave transmission, Mathematical analysis, Wave characteristics, Water waves, Sound.

This note is concerned with an axisymmetric disturbance which travels over the surface of a sphere; the disturbance is supposed to be generated in the neighborhood of a point P on a sphere, and the object is to trace the disturbance as it moves between P and the antipodal point.

NASA N62-11653 $4.60

Iowa State U., Iowa City.
ELECTRON PRECIPITATION AND THE OUTER RADIATION ZONE, by J. O'Brien and C. D. Laughlin. Rept. on NASA Contract NASw-17 and Contract N9onr 938(03). [1962] [42]p. 19 refs. SUI-62-9.

UCRL-9936 $4.60

Lawrence Radiation Lab., U. of California, Berkeley.
HYDROMAGNETIC IONIZING WAVES, by Wulf B. Kunkel and Robert A. Gross. Rept. on Contract W-7405-eng-48. 26 Dec 61, 43p. 21 refs.

UCRL-10140 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
REGGE TRAJECTORIES FOR A SINGLE ATTRACTIVE YUKAWA POTENTIAL, by Akbar Ahmadzadeh, Phillip G. Burke, and Cecil Tate. Rept. on Contract W-7405-eng-48. 27 Mar 62, 9p.

UCRL-10029 $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
TOPICS IN STATISTICAL MECHANICS OF FLUIDS, by Fortunato Danon. Doctoral thesis. Rept. on Contract W-7405-eng-48. 23 Jan 62, 68p. 58 refs.

NYO-9602 $3.60

New York U., N. Y.
KINETIC MODELING OF GAS MIXTURES, by Lawrence Sirovich. Rept. on Contract AT(30-1)-1480 1 Feb 62, 39p.

PB 160 494 $3.60

Ordnance Research Lab., Pennsylvania State U., University Park.
THE APPLICATION OF NETWORK THEORY TO THE STUDY OF VIBRATING SYSTEMS, by E. J. Skudrzyk. Rept. on Contract NOrd 16597. 1 Mar 61, 31p. 11 refs. Serial no. 7-77; AD-251 916.

DESCRIPTORS: *Electrical networks, Theory, Vibration, *Vibration mechanisms, Differential equations, *Mechanical properties, Mechanics, *Resonance, Rods, Impedance, Admittance, *Negative resistance circuits.

Since, by electromechanical analogies, electrical network theorems are applicable to mechanical systems, these theorems can be very useful in the design and analysis of mechanical systems. Without going into theoretical details, this report shows the power of these new methods in vibration studies. One of the most significant results of these studies is that the vibration level of a homogeneous system, irrespective of its complexity, can be accurately predicted from two simple parameters: the characteristic impedance and the Q of the system. For inhomogeneous systems, the modes are coupled by positive and negative resistances, and there is no longer correspondence between bandwidth and decay time. It should be pointed out that the results of the study of mechanical vibrators lead to new theorems and a deeper understanding of network theory. (Author)

PPAD-395-D $1.60

Princeton-Pennsylvania Accelerator, Princeton U. N. J.
COMPUTER PROGRAMS FOR MAGNETIC FIELDS AND CHARGED PARTICLE ORBITS IN FIELDS FROM AXIALLY SYMMETRIC COILS, by G. Schrank, G. Henry, and J. Swanson. Rept. on Contract AT (30-1)-2137. 27 Feb 61, 19p.

NASA N62-11287 $2.60

Rand Corp., Santa Monica, Calif.
PRINCIPLES OF INVARIANCE IN TRANSPORT THEORY, by T. W. Mullikin. Rept. on JPL Contract N-33561 and Contract NASw-6. 25 Apr 61,21p. 11 refs. RM-2761-JPL.

Acoustics

NASA N62-11703 $1.10

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
INSTRUMENTATION FOR SONIC BOOM REPRODUCTION, by Karl S. Pearsons. Quarterly progress rept. no. 2, 17 Oct 61-17 Jan 62, on NASA Contract NASr-58. 1962, 8p.

NASA N62-11548 $1.60

Bolt, Baranek, and Newman, Inc., Cambridge, Mass.
QUARTERLY PROGRESS REPORT NO. 3, 17 JAN TO 17 APR 1962, by Karl S. Pearsons. Rept. on NASA Contract NASr-58. 1962 [13]p.

NASA N62-11705 $4.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
RESEARCH ON VIBRATION IN COMPLICATED STRUCTURES BY ENERGY METHODS. Quarterly status rept. no. 1 on NASA Contract NASr-47. 24 Oct 61, 42p. 11 refs.

NASA N62-11704 $1.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
THE RESPONSE OF RIBBED PANELS TO REVERBERANT ACOUSTIC FIELDS, by Gideon Maidanik. Quarterly status rept. no. 2 on NASA Contract NASr-47. 30 Jan 62, 14p. 10 refs.

TID-14847 $4.60

Vanderbilt U., Nashville, Tenn.
THE ABSORPTION OF SOUND IN ETHYLENE AND ETHYLENE-d_4, by Jimmie Cleve Cates. Master's thesis. May 60, 47p. 14 refs.

Electricity and Magnetism

NASA N62-11804 $1.60

Radioscience Lab., Stanford U., Calif.
GRAPHIC DATA ON THE EARTH'S MAIN MAGNETIC FIELD IN SPACE, by R. F. Mlodnosky and R. A. Helliwell. Technical rept. no. 1 on NASA Grant NsG-174-61. Feb 62, 20p. 16 refs. SEL-62-026.

TID-14943 $1.60

Temple U., Philadelphia, Pa.
TECHNICAL PROGRESS REPORT [ON PHOTOVOLTAIC EFFECTS OCCURRING WITH ANODIZED ZIRCONIUM AND NIOBIUM ELECTRODES] on Contract AT(30-1)-2775. Feb 62, 20p.

Molecular Physics and Spectroscopy

PB 160 050 $4.60

AeroChem Research Labs., Inc., Princeton, N. J.
CALCULATION OF EQUILIBRIA IN THERMALLY IONIZED GASEOUS MIXTURES. THE SAHA EQUATION, by Daniel E. Rosner. Rept. on Contracts AF 49(638)300 and AF 04(647)157. Sep 58, 43p. 13 refs. AeroChem TM-11; AFOSR TN-60-888; AD-236 199.

DESCRIPTORS: *Chemical equilibrium, Determination, Gas ionization, Mixtures, *Quantum mechanics, Oxygen, Argon, Nitrogen compounds, Oxides, Equations of state.

The method by which equilibrium constants for ionization reactions may be computed from available spectroscopic data is discussed. Several examples are presented to illustrate the methods involved as well as the nature of the permissable assumptions. (Author)

NASA N62-11712 $1.60

Institute for Molecular Physics, Maryland U., College Park.
INTERACTION ENERGIES FROM SCATTERING CROSS SECTIONS OF HYDROGEN IONS IN CH_4, CF_4, C_2H_6, AND C_2F_6, by Robert D. Cloney and Joseph T. Vanderslice. Rept. on NASA Grant NsG-5-59. 12 Oct 61, 18p. 12 refs. IMP-NASA-28.

AD-275 613 repriced $1.00

National Bureau of Standards, Washington, D. C.
STANDARDIZATION OF THERMAL EMITTANCE MEASUREMENTS. PART III. NORMAL SPECTRAL EMITTANCE, 800° - 1400°K, by William N. Harrison, Joseph C. Richmond, and Harold K. Skramstad. Rept. for 1 July 60-30 June 61 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)61-02, continuation of Contract AF 33(616)58-20. Mar 62, 39p. WADC-TR-59-510, Part III.

DESCRIPTORS: *Thermal radiation, *Blackbody radiation, Infrared spectroscopy, *Monochromatic light, Measurement, Materials, Standardization, Platinum, Mathematical analysis, Digital computers, Programming, *Optical spectrometers, Detectors, Photomultipliers, Optical systems, Data processing systems, Digital recording systems.

Equipment for direct measurement of normal spectral emittance was modified in several respects. The test procedure was changed by incorporation of a "zero line" correction. The equipment was calibrated by means of sector-disc attenuators which passed known factions of the radiant flux from a blackbody furnace. Equipment for automatic recording of spectral data in a form suitable for direct entry into an electronic computer, and on-line computation of total emittance or solar absorptance, was designed. Working standards of normal spectral emittance were prepared and calibrated. An equation relating the normal spectral emissivity to five other parameters of a metal was solved "by hand" for one set of data. Some progress was made in setting up a program for solution of the equation by use of an electronic computer. (Author) (See also AD-259 326)

NASA N62-11752 $1.60

New York U., N. Y.
THEORETICAL STUDY OF ATOMIC AND MOLECULAR GASES AND THEIR REACTIONS IN THE UPPER ATMOSPHERE, by R. C. Sahni. Summary rept. for 1 Nov 60-30 Apr 61, on NASA Grant NsG-76-60. [1961] 12p. 2 refs.

UVA-178-61U $4.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
THE HOLWECK TYPE MOLECULAR PUMP, by E. N. Sickafus, R. B. Nelson, and R. A. Lowry. Rept. on Contract AT(40-1)-1779. Aug 61, 44p. 24 refs. EP-4422-178-61U.

WIS-AEC-11 $3.60

Wisconsin U., Madison.
THE ENERGY OF INTERACTION BETWEEN TWO EXCITED HYDROGEN ATOMS IN EITHER 2s OR 2p STATES, by Bruno Linder and Joseph O. Hirschfelder. Rept. on Contract AT(11-1)-298. 18 Apr 57, 39p. 16 refs.

WIS-AEC-6 $3.60

Wisconsin U., Madison.
SHORT RANGE INTERMOLECULAR FORCES. II. H_2-H_2 AND H_2-H, by Edward A. Mason and Joseph O. Hirschfelder. Rept. on Contract AT(11-1)-298. 6 June 56, 34p. 16 refs.

Optics

PB 160 502 $1.60

Coast Guard, Washington, D. C.
AVERAGE ATMOSPHERIC TRANSMISSIVITY OF U. S. COAST LINE. 1 Aug 54, 11p. Civil Engineering rept. CG-250-5; AD-225 679.

DESCRIPTORS: *Atmosphere, *Light transmission, *Atmospheric refraction, Measurement, Coast Guard research.

UCRL-9954 $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
THE MEASUREMENT OF RADIATIVE LIFETIMES, by Robert Berg. (Doctoral thesis.) Rept. on Contract W-7405-eng-48. Mar 62, 108p. 81 refs.

NASA N62-11138 $1.60

Rochester U., N. Y.
CARRIER TRANSIT TIME MEASUREMENT IN SELENIUM, A. LIUMOGEN, SODIUM-SALICYLATE, B. LUMINESCENCE OF THALLIUM DOPED ALKALI HALIDES, C, by R. M. Blakney. Quarterly status rept. no. 2(A-C) 1 Dec 61-28 Feb 62, on NASA Contract NASw-107. 1962, 11p.

Solid State Physics

HW-70859 $5.60

Hanford Atomic Products Operation, Richland, Wash.
TRANSFORMATION KINETICS OF PLUTONIUM PART III, by R. D. Nelson. Rept. on Contract AT(45-1)-1350. Dec 61, 56p. 33 refs.

TID-15255 $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
RESEARCH ON X-RAY INVESTIGATION OF THE STRUCTURE OF SMALL PARTICLES. Annual rept. on Contract AT(30-1)-2708. 12 Jan 62, 19p. 21 refs.

TID-15390 $2.60

Michigan Coll. of Mining and Tech., Houghton.
STRUCTURE AND PROPERTIES OF SOLID SOLUTIONS. Technical progress rept. no. 2, 1 Mar 61-28 Feb 62, on Contract AT (11-1)-916. 26 Mar 62, 29p. 15 refs.

TID-14566 $3.60

Pennsylvania State U. Coll. of Mineral Industries, University Park.
THERMODYNAMIC PROPERTIES OF SOLID SOLUTIONS AT HIGH TEMPERATURES, by Arnulf Muan and Egil Aukrust. Progress rept. 1 May-15 Dec 61, on Contract AT(30-1)-2781. 15 Dec 61, 34p.

NYO-2843 $8.60

Union Carbide Metals Co., Niagara Falls, N. Y.
METALLIC SOLID SOLUTIONS, by B. A. Green, H. T. Pinnick and others. Final rept. for period ending 15 June 61, on Contract AT(30-1)-2381. 31 Aug 61, 91p. 81 refs.

Thermodynamics

IS-440 $0.75

Ames Lab., Iowa State U. of Science and Tech.
DETERMINATION OF THERMODYNAMIC FUNCTIONS FOR THE FORMATION OF BINARY INTERMETALLIC PHASES FROM VAPOR PRESSURE MEASUREMENTS, by J. F. Smith. Rept. on Contract W-7405-eng-82. Mar 62, 29p. 14 refs.

PB 160 512 $1.60

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
COEFFICIENTS OF THERMAL EXPANSION OF SOLIDS AT LOW TEMPERATURES. IV. THE THERMAL EXPANSION OF TYPE 340 STAINLESS STEEL AND YELLOW BRASS, by Howard W. Altman, Thor Rubin, and Herrick L. Johnston. Technical rept. no. 28 on Liquid Hydrogen as an Aircraft Fuel, Contract W 33-038-ac-14794. 8 Mar 54, 17p. 3 refs. Rept. no. TR-264-28; AD-31 268.

DESCRIPTORS: *Solids, *Stainless steel, Steel, *Brass, *Thermal expansion, Temperature, Cryogenics, Aviation fuels, Fuels, Hydrogen, Liquefied gases.

Thermal expansion coefficients were interferometrically determined for type-304 stainless steel and yellow brass; determinations were made in the temperature range from liquid H to above the ice point for the alloys. Data which gave negative expansion coefficients for stainless steel below 35°K were checked with measurements on all 3 axes of the sample. The accuracy of the coefficients of the steel sample was not better than 0.02×10^5 - units. The yellow-brass data followed a normal S-shaped curve characteristic of homogeneous strain-free substances. The size of the apparatus did not permit reaching temperatures below 12°K; the lowest obtainable data were obtained at about 16°K.

NASA N62-11436 $1.10

Denver Research Inst., Colo.
SUBCOLLED BOILING IN A NEGLIGIBLE GRAVITY FIELD, by Thomas R. Rehm. Status rept. no. 2 on NASA Grant NsG-143-61. 17 Apr 62, 5p.

PB 161 648 $0.50

National Bureau of Standards, Boulder, Colo.
CRYOGENIC TEMPERATURE MEASUREMENT WITH PLATINUM RESISTANCE THERMOMETERS - IS FIXED-POINT CALIBRATION ADEQUATE?, by Robert J. Corruccini. 30 Apr 62, 16p. 5 refs. Technical note no. 147.

DESCRIPTORS: *Platinum, *Resistance thermometers, Thermometers, Calibration, *Cryogenics, Temperature Measurement, Numerical methods and procedures.

An analysis of extensive calibration data for strain-free "capsule"-type platinum resistance thermometers indicates that the above question can be answered affirmatively for temperatures down to 14°K. For such thermometers, interpolation can be performed by a numerical procedure that makes use of similarites in the form of the departures of various thermometers from Matthiessen's rule. Where thermometers of more rugged construction or lower purity are concerned, the data needed to answer the question are not available. However it is suggested that the answer may still be "yes" provided the thermometers are sufficiently uniform in their characteristics. (Author)

NASA N62-11779 $7.60
Also available as AD-262 673

National Bureau of Standards, Boulder, Colo.
PROVISIONAL THERMODYNAMIC FUNCTIONS FOR PARA HYDROGEN: IN LIQUID, FLUID AND GASEOUS STATES AT TEMPERATURES UP TO 100°K AND AT PRESSURES UP TO 340 ATM, by R. D. Goodwin, D. E. Diller and others. 4 Aug 61, 79p. 3 refs. NBS Rept. 6791.

AD-268 205 $9.10

National Research Labs., Ottawa (Canada).
FLOW OF HEAT FROM A WEDGE INTO A SURROUNDING MEDIUM, by P. Mandl. Aug 61, 102p. 7 refs. Aeronautical rept. LR-312; NRC no. 6520.

DESCRIPTORS: Fluid flow, *Wedges, *Heat transfer, Temperature, Cooling, Diffusion, Time, Thermodynamics, Phase Transitions, Heat.

The transient temperature field due to the cooling, of a thin, liquid wedge by a surrounding infinite heat sink is calculated. If the change in phase of the medium is ignored, the temperature distribution can be calculated by infinite series, using a step-by-step procedure; the convergence of this method is rapid everywhere except near the tip of the wedge. It may be inferred from the predicted motion of the isothermal surfaces that solidification proceeds from the vertex mainly in the radial direction. An attempt is made to extend the theory by allowing for a change in the state of the medium. (Author)

CNLM-1802-16 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
BOILING HEAT TRANSFER OF LIQUID METALS, comp. by Elizabeth A. Gernak. A literature search 3 Oct 60, 4p. 16 refs.

NASA N62-10948 $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORETICAL AND ANALYTICAL INVESTIGATION OF THE THERMODYNAMIC AND TRANSPORT PROPERTIES AND STAGNATION POINT HEAT TRANSFER IN PARTIALLY IONIZED AIR, by Sinclaire M. Scala. Quarterly progress rept. no. 2, 1 Aug-31 Oct 61, on NASA Contract NASr-32. [1961] [14]p. 6 refs.

NASA N62-11431 $1.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORETICAL AND ANALYTICAL INVESTIGATION OF THE THERMODYNAMIC AND TRANSPORT PROPERTIES AND STAGNATION POINT HEAT TRANSFER IN PARTIALLY IONIZED AIR, by Sinclaire M. Scala. Quarterly progress rept. no. 3, 1 Nov 61-31 Jan 62, on NASA Contract NASr-32. [1962] [7]p. 6 refs.

NASA N62-11654 $2.60

Valley Forge Space Technology Center, General Electric Co., King of Prussia, Pa.
PARTIALLY IONIZED GASES. A REVIEW OF TRANSPORT AND THERMODYNAMIC PROPERTIES, by Charles W. Baulknight. Rept. on NASA Contract NASr-32. [1962] 26p. 31 refs.

Presented at Western States Section, Combustion Inst., Second Conference of Kinetics, Equilibria and Performance of High Temperature Systems, U. of California, Los Angeles.

Wave Propagation

PB 160 456 $10.50

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF WAVE PROPAGATION IN SEMI-SOLIDS, by William F. Riley, James W. Dally, and A. J. Durelli. Final rept. on Contract AF 29(601)465. Mar 58, 135p. 18 refs. ARF Proj. no. K115; AFSWC-TN-58-18.

DESCRIPTORS: *Solids, *Photoelastic materials, Materials, Sheets, Rods, Disks, Wave Transmission, *Wave analysis, Propagation, Physical properties, Optics, Blast, Impact shock, Stresses, Load distribution *Barium compounds, *Titanates, Diaphragms (Mechanics), *Pressure gages, Gages, Tests, Microphotography, Photography.

A microflash method was developed for recording photoelastic patterns and grid deformations simultaneously. A soft photoelastic material (Hysol 8705) was selected as the model material and its static and dynamic properties (physical and optical) were completely determined. By using the photoelastic pattern, the grid measurements, and the material properties it was possible to determine stress distributions resulting from impact type loadings. As an indication of the procedure to be used the principal stresses along the vertical diameter of a disk subjected to a

diametrical compressive impact loading were determined. The use of the Fastax camera was continued and applied to the study of wave propagation phenomena in large plates subjected to air blast and explosive type loadings. This series of tests clearly showed that a shock tube can be used in conjunction with photoelastic models for air blast studies. The performance of barium titanate and diaphragm type pressure gages embedded in soil or soft rubber specimens and subjected to impact loadings was studied.

PB 161 596 $2.50

National Bureau of Standards, Boulder, Colo.
CHARACTERISTICS OF POINT-TO-POINT TROPOSPHERIC PROPAGATION AND SITING CONSIDERATIONS, by R. S. Kirby, P. L. Rice and L. J. Maloney. 19 Oct 61, 108p. 28 refs. Technical note no. 95.

DESCRIPTORS: *Radio waves, Propagation, *Radio transmission, Mathematical analysis, *Atmosphere, Electromagnetic properties, Attenuation, *Electromagnetic waves, Radiation hazards, Ionospheric propagation.

PB 151 377-13 $1.75

National Bureau of Standards, Boulder, Colo.
QUARTERLY RADIO NOISE DATA DECEMBER, JANUARY, FEBRUARY 1961-62, by W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. 22 May 62, 67p. 11 refs. Technical note no. 18-13.

DESCRIPTORS: *Noise (Radio), Measurement, Tables.

See also PB 151 377-12

NASA N62-11438 $1.60

Oklahoma State U. Research Foundation, Stillwater.
DIGITAL COMPUTER SOLUTION FOR THE PROPAGATION OF A SPHERICAL SHOCK WAVE IN ALUMINUM, by H. R. Lake and F. C. Todd. Rept. on NASA Contract NASr-7. [1961] [15]p. 7 refs.

SC-4669(RR) $11.50

Sandia Corp., Albuquerque, N. Mex.
"INVARIANT IMBEDDING" AND WAVE PROPAGATION IN INHOMOGENEOUS MEDIA, by Crawford J. MacCallum. Nov 61, 146p. 44 refs.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

RDA-1 0$.50

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
RESEARCH AND DEVELOPMENT ABSTRACTS OF THE USAEC, Jan-Mar 62. 48p.

NASA N62-11555 $2.60

Bell Aerosystems Co., Buffalo, N. Y.
RESEARCH ON ZERO-GRAVITY EXPULSION TECHNIQUES, by Alexander Krivetsky, Durwood Anderson and others. Quarterly progress rept. no. 2, 1 Aug-1 Nov 61, on NASA Contract NASr-44. [1961] 23p. 4 refs. Rept. 7129-933002.

SOCIAL SCIENCES

Documentation

PB 159 179 $5.60

Chemical Abstracts Service, Ohio State U., Columbus.
STUDY OF SEMANTICS IN RELATION TO THE MACHINE LANGUAGE OF CONCEPTS, by Herbert J. Friedman and G. Malcolm Dyson. Final rept. Jan 60-Mar 61, on National Science Foundation Grant 10340. [1961] 57p. 17 refs.

DESCRIPTORS: *Chemistry, Literature, *Language, Abstracting, Classification, Vocabulary, Punched card methods, Documentation.

The words of the abstracts from part of one issue of Chemical Abstracts, vol. 54, columns 735g-736b of section 11H (Pharmacology), were counted and analyzed. Out of 557 words, 258 words (46.3%) were technical or scientific while 299 (53.7%) were common general words. As more abstracts from various sections were examined the lists of words continued to grow rapidly even after several hundred words had been collected and it was impossible to determine the size of the vocabulary that chemists use in any section of the journal. In 106 abstracts from section 11G (Pathology) certain very common words were found more often than they occur in general writing. The words "were" and "by" occurred 3 times as often, and the words "of", "in", and "with" more than twice as often. The 11 most frequently used words amount to 30% of the abstract material and only 21% of general writing. It is suggested that (1) the fact that abstracts are often written in the passive voice requires the frequent use of the words "was" and "by", (2) chemistry requires that chemists do something "in" things and "to" things and "with" things, and (3) chemists may write longer and more complex sentences than normal, which requires many prepositional phrases. Another study showed that the words which appear in a 10-word vocabulary characteristic of one section of the journal appear less frequently in abstracts from other sections.

PB 160 496 $7.60

Designers for Industry, Inc., Cleveland, Ohio.
MECHANIZED PROCESSING OF ENGINEERING AND PRODUCTION INFORMATION: A UNIVERSAL MAN-MACHINE CODING SYSTEM. Summary rept. on Contract NOa(s) 58-459d. Mar 59, 79p. AD-225 550.

DESCRIPTORS: *Engineering, Production, Data, Processing, *Data processing systems, Documentation, *Coding, Automation, *Manufacturing methods, Data storage systems, Digital computers.

Many fields of technology were investigated. A few of these fields are: computing, data-processing, information retrieval and machine literature searching, automation (in many forms), numerical control, pattern recognition, machine language translation, and information theory. The coding system described is the product of a careful evaluation and distillation of knowledge from these fields and several others. It is not a pure conception, but rather a synthesis of many ideas. (Author)

PB 160 555 $7.60

Herner and Co., Washington, D. C.
FACTORS GOVERNING THE ANNOUNCEMENT AND PUBLICATION OF UNITED STATES GOVERNMENT RESEARCH REPORTS, by Saul Herner and Mary Herner. Rept. on Contract NSF-C153. Dec 61, 80p.

DESCRIPTORS: *Scientific reports, Military research, Scientific research, Indexes, Abstracting, *Periodicals, *Documentation, Dissemination.

The focus of the study was on the direct citation or abstracting of reports in 13 major abstracting and indexing publications, on the publication of whole or partial reports in journals, books, and other media, and on the overall physical availability of reports.

PB 160 556 $1.10

Herner and Co., Washington, D. C.
SPEED OF ANNOUNCEMENT OF UNITED STATES GOVERNMENT RESEARCH REPORTS IN TECHNICAL ABSTRACT BULLETIN, U. S. GOVERNMENT RESEARCH REPORTS, AND NUCLEAR SCIENCE ABSTRACTS, 1961-62, by Mary Herner and Barbara Kolber. Rept. on Contract NSF-C213. Mar 62, 7p.

DESCRIPTORS: *Scientific reports, Military research, Scientific research, Indexes, Abstracting, *Periodicals, *Documentation, Dissemination.

See also PB 160 555

PB 160 480 $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
STUDIES IN INFORMATION STORAGE AND RETRIEVAL. I. ON THE USE OF GODEL INDICES IN CODING, by R. Creighton Buck. Rept. on Contract DA 11-022-ORD-2059. Oct 58, 271. MRC Technical summary rept. no. 53; AD-207 325.

DESCRIPTORS: *Documentation, Coding, Information theory, Indexes, *Mathematics, *Data storage systems, Classification.

MISCELLANEOUS

PB 181 074 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. July 62.

DESCRIPTORS: *Naval research, *Scientific research, *Ultraviolet spectroscopy, Hydrogen ion concentration, Gamma rays, Carbon, Hydrogen, Recording systems, *Atmosphere, *Astrophysics, Ocean waves, Microseisms, Storms, Chemistry, Ionization, Gas ionization, Oxygen, Platinum, Electrodes, Fire extinguishers, Powders, Mechanics, Fracture (Mechanics), Thermal stresses, Thermocouples, Thermometers, Helium, Ultrasonics, Non-destructive testing, Rockets, Tungsten, Guns, Metallurgy, Ceramic materials, Refractory materials, Steel, Niobium, Liquid metals, Impurities, Zinc, Corrosion inhibition, Mooring buoys, Nuclear physics, Sea water, Gases, Radio, Communication systems, Shipborne, Transmitter-receivers, Plasma physics, Exhaust gases, Semiconductors, Diodes, Neodymium, Ytterbium, Ions, Silicates, X-rays, Potassium compounds, Bromides, Chlorides, Scientific reports, Patents, Solid state physics, Holmium, Glass

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Some Recent Advancements in Solar Ultraviolet Spectroscopy (4000A-2200A and 700A-168A), by W. E. Austin, D. L. Garrett, J. D. Purcell, and R. Tousey

Effect of Acidity on the Hydrogen Yield in Gamma-Irradiated Aqueous Solutions, by C. H. Cheek, V. J. Linnenbom, and J. W. Swinnerton

Electric Bond Pumping of Hydrogen with a Carbon Arc, by W. W. Balwanz

Scientific Program:

Applications Research: On thermoplastic recording, storage, and projection systems

Atmosphere and Astrophysics: Spectra of ocean waves and microseisms as related to storms at sea

Chemistry: Transition from hydrogen ionization to oxygen evolution on a platinum electrode. Evaluation of certain aspects of multipurpose powder fire-extinguishing agents

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